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NNUAL REPORT

OF THE

ROYAL CORNWALL

POLYTECHNIC SOCIETY.

1883. 1883.

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Royal Cornwall Polytechnic Society.

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Charles Henry Fox, M.D.
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Nathaniel Fox.
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Robert Fox.
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George H. Fox.
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R. H. Carter.
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R. J. Frecheville, F.G.S.
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Rev. Canon Phillpotts, M.A.

ST. AUSTELL AND FOWEY DISTRICT.

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John Tremayne.

BODMIN DISTRICT.

Right Hon. Lord Robartes.

PLYMOUTH DISTRICT.

Francis E. Fox, B.A., F.R.G.S.

LONDON DISTRICT.

W. Brooks.
Rev. F. C. Jackson.
Peter Watson.

List of Presents to the Library,

1883.

American Geographical Society.—Bulletin, 1882-3.

American Journal of Science, 1883.

Annual Report of the Chief Signal Officer.—U.S. Government, 1880.

Annual Report of the Surgeon General U.S. Army, 1883.

Askja—Iceland's largest Volcano. By W. G. Lock, F.R.G.S., presented by the Author.

Bristol Natural History Society's proceedings.—Volume IV., part I.

Chemical Society.—Journal 1883.

"Down in a Mine;" and other sketches in verse. R. Hambley, presented by the Author.

Geologists' Association.—Proceedings, 1883.

Geological Society of Glasgow.—Transactions. Volume VII., part I.

Greenwich Magnetical and Meteorological Observations,—from the Astronomer Royal.

Institution of Mechanical Engineers.—Proceedings, 1883.

Miners' Association of Cornwall and Devon.—Report and Proceedings, 1882.

Mining Institute of Cornwall.—Proceedings, 1882.

Meteorological Observations at Stations of the Second Order, for the year 1870,—from the Meteorological Office.

Meteorological Atlas of the British Isles, ditto.

North of England Institute of Mining and Mechanical Engineers' Transactions.—Vol. 31, part 5, Vol. 32, parts 1, 2, 3, 4, 5, and Vol. 33, parts 1, 2.

Notes on Slips connected with Devonshire.—Part VI.—By W. Pengelly, F.R.S., F.G.S. Presented by the Author.

Notes on Notices of the Geology and Palæontology of Devonshire. Part X. ditto ditto.

On a Flint Implement, found on Torre Abbey Sands, Torbay, in 1883. ditto ditto.

Discoveries in the more recent deposits of the Bovey Basin, Devon. ditto ditto.

Plymouth Institution and Devon and Cornwall Natural History Society,—Annual Report and Proceedings.—Volume 8, part 2.

Philosophical Society of Glasgow.—Proceedings, 1882-3.

Quarterly Weather Report.—Daily Weather Charts.—Hourly Readings, etc.—from the Meteorological Office.

Rainfall Tables of the British Islands for 1866-1880. (Meteorological Council.

Report of the Comptroller of the Currency, U.S.A.—1882.

Royal Institution of Great Britain.—Proceedings.—Vol. 10, parts 1, 2.

Royal Institution of Cornwall.—Journal.—Vol. VII, part 4.

Royal Geological Society of Cornwall.—Transactions.—Vol. 10, part 5.

Royal Geological Society of Ireland.—Journal.—Vol. VI., part II.

Royal Scottish Society of Arts.—Transactions.—Vol. 10 part 5.

Royal Irish Academy.—Transactions and Proceedings.—1882-3

Royal Dublin Society.—-Scientific Transactions.—-Vol. 1 series 2, and vol. 2, series 2.

Society of Arts.—Journal, 1883.

Society for Psychical Research.—Vol. 1, parts 2 and 3.

Smithsonian Report, 1881.

University College, London.—Calendar, 1883-4.

Annual General Meeting.

The Fifty-first Annual General Meeting was held at the Polytechnic Hall, on Thursday, February 14th, 1884. The chair was taken by Mr. **Harry Tilly**, one of the Vice-Presidents. Amongst those present were Mr. Howard Fox, vice-president, Rev. G. T. Bull, M.A., Rev. F. R. Hole, M.A., Rev. C. R. Gardner, Messrs. C. Barham, M.D., Robert Fox, W. L. Fox, F.R.Met.Soc., R. M. Tweedy, E. D. Anderton, A. Lloyd Fox, R. Carter, S. Bennetts, John Stephens, F. J. Bowles, and E. Kitto, F.R.Met.Soc. (secretary). The ladies present included Mrs. Rogers, Mrs. Genn, Mrs. Robert Fox, Mrs. Howard Fox, Mrs. Hole, Mrs. Tweedy, and Miss A. Tregelles.

The **Secretary** (Mr. E. Kitto) read the minutes of the last Annual General Meeting, which were confirmed, and signed by the Chairman.

The Report of the General Committee for the year 1883 was read.

The **Chairman**, in moving its adoption, explained that the Earl of Mount Edgcumbe, the president, had found it impossible to attend the meeting, as his Parliamentary duties necessitated his attendance at the House of Lords.

The adoption of the Report was seconded by the Rev. G. T. **Bull**, M.A., and unanimously carried.

The **Secretary** reported that a suitably bound copy of the Jubilee Report had been offered for the Queen's acceptance, and that it was accompanied by a letter, signed by the President, on behalf of the Society, a copy of which he read. Her Majesty had been graciously pleased to accept the volume, and Mr. Kitto read the reply, dated from Windsor Castle, to that effect.

The financial statement for the year 1883 was read and adopted.

The Report of the Meteorological Committee and their financial statement were read and unanimously adopted.

In the course of a discussion which followed, Dr. **Barham** said he was of opinion that the Meteorological work carried on by the Society conferred honour upon it, and benefit to the county; he was glad that the Meteorological Council had decided to continue the grant for the maintenance of the Observatory.

Mr. **Robert** Fox suggested that as the Observatory was for the benefit of the county at large, an appeal should be made to the friends of the Society generally for funds for the purchase of the site, and of a building for the New Observatory as stipulated by the Meteorological Council.

After some discussion it was proposed by Mr. **Robert** Fox, seconded by Mr. W. L. Fox, and resolved, "That the Earl of Kimberley's offer be accepted, and that the whole matter be left with the Observatory Committee for settlement, who are authorised by this meeting—in addition to taking such other measures for the purpose as they may think desirable—to forward a circular to all friends of the Society for the purpose of soliciting their help towards raising the purchase money of the site selected, and the cost of erecting a New Observatory."

It was proposed by Mr. W. L. Fox, seconded by Mr. **John Stephens**, and resolved, "That the Observatory Committee be authorised to take the necessary steps for the erection and fitting up of the New Observatory."

It was proposed by Mr. **Howard** Fox, seconded by Mr. **John Stephens**, and unanimously resolved, "That the Right Hon. Earl of St. Germans, Professor W. Grylls Adams, F.R.S., Mr. J. C. Kennerley, J.P., and Mr. R. J. Frecheville, F.G.S., be elected Vice-Presidents of the Society."

The General Committees for the various districts were elected, and the names of the Rev. C. R. Gardner and Mr. F. J. Bowles were added to the list for the Falmouth district.

The Report of the Committee of the Art Union of Cornwall and their financial statement were read and adopted. A vote of thanks to the Hon. Secretary, Mr. W. W. J. Sharpe, was proposed by Mr. **HOWARD FOX**, who stated that Mr. Sharpe had carried out his duties very satisfactorily, and that having at one time filled the office he knew, from experience, the amount of work and attention it entailed on the Secretary. He should be glad if the Fine Art department of the Exhibition could receive such encouragement and patronage by the private sale of pictures as would enable it to dispense with the drawing for prizes in the Art Union. He thought that if the leading people of the county, who were in the habit of attending the opening of the exhibition, would make a point of purchasing pictures, it would set a good example to others who, attending on subsequent days, and seeing several pictures marked "sold," might also be induced to make purchases. A very successful effort in this direction was made by the late Mr. W. P. Dymond.

The vote of thanks to Mr. Sharpe was unanimously accorded.

On the proposition of the **CHAIRMAN**, the best thanks of the Society were given to Messrs. F. W. Michell, Jas. Hosking, and J. B. Tilly, for services to the Mechanical Department of the exhibition; to Messrs. Sydney Hodges, B. S. Marks, F. Dicksee, C. T. Davidson, and C. Napier Hemy, for loan of paintings; to Mrs. Guppy and Mr. Burton for loan of curiosities and oriental ware; to Mrs. Genn, Mr. Davidson, and Mr. G. H. Taylor, for their services as "hanging committee;" to Messrs. C. W. Robinson and T. J. Thuell, and those ladies and gentlemen who kindly assisted them in the musical entertainments during the exhibition; to those gentlemen who gave lectures and addresses;

to the Judges in the various departments; and to the donors of books, &c., to the library.

Mr. **Howard Fox** alluded to the many valuable and interesting Books and Reports contained in the Library, and impressed on the meeting that it was open to members daily,—a place where they might sit and enjoy a quiet perusal of the valuable publications of many of the scientific and literary societies of the world.

A list of books presented to the Library during the past year was read.

Mr. E. E. **Dymond**, F.R. Met. Soc., having paid the prescribed composition fee of five guineas for election as a Life Member of the Society, was elected a Life Member accordingly.

Mr. **Robert** Fox suggested that as the year 1884 was the centenary year of Murdoch, the engineer, who first tried a model of his steam engine on the roads at Redruth, in the year 1784, and who, whilst residing at Redruth, was also the first Inventor of Coal Gas as an illuminant, the next Polytechnic Exhibition should in some special way be made to commemorate this great inventor. Mr. Fox remarked that the idea had originated with Mr. Nathaniel Fox, who he regretted was unable to attend the meeting, as he could have given much fuller information.

Dr. **Barham** thought that in the event of any such special commemoration, the names of Trevithick and Goldsworthy Gurney should be included.

It was proposed by Mr. E. D. **Anderton**, and resolved, that the General Committee be requested to give the matter careful consideration at their next meeting.

A unanimous vote of thanks to the Chairman for presiding, concluded the business.

Report of the General Committee for the year 1883.

Your Committee have the satisfaction to report that the year 1883 has been one of fair prosperity. Some anxiety was felt, lest the Society should suffer a relapse after the great efforts put forth in celebrating the Jubilee during the preceding year, but such was not the case. On the contrary, the year has been one of vigorous action on the part of the Executive and of friends, and the course of events has proved that the Society still retains the support of the county generally, and the esteem of scientific men throughout the country at large. The statement of accounts submitted to you shows a considerable credit balance, though materially reduced from that of last year, owing to the heavy expenses of the Exhibition, and to the cost of the Jubilee Report, which was £72 14s. 6d., being £47 10s. 7d. in excess of the average cost of the Annual Reports for the five years immediately preceding. It must be remembered however that the Jubilee Report is the largest volume ever published by the Society, and that the above-named sum includes the cost of 14 bound presentation copies, and of a handsomely bound copy, which, accompanied by a letter signed on behalf of the Society by your President, was offered for the acceptance of the Queen, your Royal Patroness. Her Majesty was graciously pleased to accept the volume.

The letter addressed to Her Majesty, and the reply thereto, dated from Windsor Castle, will be published in the Annual Report.

Extra expense has also been incurred in improving the means of exit from the Society's buildings in case of fire or other emergency; and in the appointment of new Trustees for the Polytechnic Hall, as only two of the original Trustees remain alive.

The Annual Exhibition was a very successful one in regard to the quality and practical utility of the exhibits, and the attendance of visitors.

Referring to the section of Mechanics, it is your Committee's pleasure to report that not only was there a large entry, but that many of the exhibits showed much originality, and great excellence; indeed in point of importance, this department compared favourably with that of the Jubilee itself. With a view of offering every facility to inventors and manufacturers for the proper display of their goods, a large warehouse at the Falmouth Docks, connected with the railway siding, was engaged for the reception of heavy machinery, and the necessary arrangements made for the working of such machines as it might be desired to show in motion. Gas and water were specially laid on, and steam power also provided. The most important feature at the Docks Exhibition was the competitive trial of Pulverisers. Three machines were in competition, viz:—Messrs. Michell and Tregoning's, Capt. J. Nicholas's, and Mr. A. Pryor's. The trial consisted in grinding both raw tin sand, and burnt leavings, for a given number of hours, the material used being carefully assayed, both before and after treatment; the steam power employed in each case being also taken. The result was the award of the Society's 1st Silver Medal to Messrs. Michell and Tregoning's machine. Full particulars of the work performed by each machine will be published in the Annual Report. The steam engine used was kindly lent by Mr. F. W. Michell, of Redruth. It will be remembered how much this gentleman did to enhance the success of the Jubilee celebration, and it is with a sense of continued obligation to Mr. Michell, that your Committee report the very valuable service he has again rendered the Mechanical Department, of which he undertook the supervision, giving up much of his time in inviting contributions of machinery, in corresponding with exhibitors, and in making special visits to Falmouth on several occasions to confer with your Secretary, as well as in attending Committee Meetings at Falmouth and elsewhere.

The trial of Rock Drills, which from accidental causes could not be conducted at the Docks, was subsequently carried out with complete success at East Pool Mine, where through the kindness of Capt. Bishop, compressed air was supplied for the purpose of the trial, and every facility afforded. The trial was superintended by Mr. James Hosking, of Camborne, to whom you are indebted for much valuable assistance.

At the Docks a very careful test was also made of Messrs. Crossley's "Otto" Gas Engine, conducted by Mr. W. Sisson, Mr. Harris, of the Falmouth Gas Works, and Mr. J. B. Tilly, Engineer of the Falmouth Docks Co. A full statement of the results of the test, prepared by Mr. Sisson, will be published in the Annual Report.

Mention should be made of the ready assistance which Mr. Tilly afforded the Society throughout the Exhibition.

The Exhibition at the Docks included Mr. Husband's Patent Oscillating Cylinder Stamper, A. B. Fraser & Co.'s Patent Fresh Water Distiller, Utley's Ship Ventilators, Boyle's and Lamb's House Ventilators, Hathorne & Co.'s Patent Tunnel Car, Hathorne, Davey & Co.'s Differential Engine Gear, and Bolling and Lowe's Portable Railway; whilst the varied display at the Polytechnic Hall included a very interesting series of models of safety appliances for Mine Cages or Skips. The great expense of the special exhibition at the Docks, and the carrying out of the before mentioned important competitive trials, seriously affected the funds of the Society, and seeing that the Society gives constant encouragement to the introduction and improvement of machinery for the development of mining and other industries, your Committee feel that an earnest appeal should be made to those directly interested in the commercial enterprise of the county for further pecuniary support.

Among the many objects of utility in the domestic section of Mechanics shown at the Polytechnic Hall, was an important display of Gas Cooking and Heating Stoves sent by Messrs. John Wright & Co., of Birmingham, also a series of Gas Grillers and Cooking Stoves from Messrs. Beynon and Cox, of Torquay.

Other departments at the Hall were of the usual varied character. Of contributed articles, mention should be made of the following :—In Fine Arts, the works of Messrs. Sydney Hodges, B. S. Marks, Frank Dicksee, C. Davidson, and C. Napier Hemy. In Ornamental Art, admirable examples of richly decorated oriental ware from Mr. J. Burton; and a number of weapons, canoe, specimens of native dress and ornament, &c., from the Solomon Islands, kindly lent by Mrs. Guppy.

Instructive evening lectures were delivered, including one entitled "Pictures and Word Pictures," by Mr. Sydney Hodges, which was well received, not only on account of the lecturer's past association with the Society, but also from his masterly treatment of the subject.

With a view to enhance the attraction and popularity of the Exhibition, arrangements were made for high class promenade concerts, of which two were given, the first under the management of Mr. C. W. Robinson, and the second of Mr. T. J. Thuell. Both these entertainments were highly appreciated and financially successful. Your warmest thanks are due to those gentlemen, whose services were most readily and gratuitously given, and to the ladies and gentlemen who so kindly assisted on those occasions.

The total amount received for admission to the Exhibition exceeded that of any previous year, the Jubilee alone excepted. Your Committee would record their appreciation of the kindness of the Royal Institution of Cornwall, who in a spirit of co-operation arranged that their Annual Excursion—extending over two days—should again this year take place during the Polytechnic Exhibition, in order that its Members might have an opportunity of joining it. Several Members availed themselves of the opportunity, and were much pleased with the excursion, especially with the second day's programme, which included a visit to the interesting mansion of Cotehele, where by the kind invitation of its owner, the Earl of Mount Edgcumbe, your President, who personally conducted the visitors over the mansion and grounds, a large number were hospitably entertained.

The Polytechnic Exhibition was again made the place of the Annual Excursion of the Miners' Association of Cornwall and Devon, and their Annual Meeting was as usual held in the building. A friendly spirit towards the Society has also been shown by the Mining Institute of Cornwall, who have expressed their desire to make an exchange of publications.

The drawing for Prizes in the Art Union of Cornwall took place as usual during the Exhibition. Amongst others a prize was won by the Earl of Northbrook, who on being so informed, wrote to the Honorary Secretary offering his prize to the Polytechnic Society, and requesting that your Committee would select a work of art to the value of the prize, to be hung in their rooms.

Selection was made of a water colour drawing, entitled "Old Lizard Head from Carthillion," by a local artist, Mr. W. Boase Smith, which, bearing a suitable inscription, now hangs in the Secretary's room.

The hearty thanks of the Society have been conveyed to Lord Northbrook for this pleasing gift.

Your thanks are due to Mr. W. W. J. Sharpe for his continued services as Honorary Secretary to the Art Union.

Apart from the Annual Exhibition there is nothing which has so occupied the time and attention of your Committee during the past year as the question of the retention of the Falmouth Meteorological Observatory, which since its establishment in 1868, has been under the local management of this Society. So early as 21st February last, the Meteorological Council officially communicated their proposal to reduce the number of first class Observatories in the United Kingdom from seven to three, Falmouth being one of those to be discontinued, and notified that the grant for its maintenance would therefore cease to be paid after the 31st December following.

Your Committee recognising the value and importance of the Observatory, not only to Falmouth as a large shipping port and to the county, but to the whole country, as well on account of its important geographical position as of the scientific value of the observations there recorded, at once put themselves in communication with the Meteorological Council, urging that a reconsideration of their proposal with regard to Falmouth might be made, and asking the Council to receive a deputation from the Polytechnic Society on the subject. It was ultimately arranged that the Deputation should be received at the Meteorological Office, London, on Wednesday the 27th June. On the day appointed the Deputation, consisting of your President, the Earl of Mount Edgcumbe, Chairman; the Earl of St. Germans; Lord Robartes; Professor J. Couch Adams, F.R.S., Cambridge; Professor W. Grylls Adams, F.R.S., King's College, London; Professor Warrington W. Smyth, F.R.S., of the Royal School of Mines, London; Sir John St. Aubyn, Bart., M.P.; Sir Joseph W. Pease, Bart., M.P.; Mr. A. Pendarves Vivian, M.P.; Mr. C. Dyke Acland, M.P.; Mr. D. J. Jenkins, M.P.; Mr. Charles C. Ross, M.P.; Mr. Jas. Cropper, M.P.; Mr. Isaac Wilson, M.P.; Col. Tremayne, Mr. E. E. Dymond, Mr. T. S. Bolitho, Mr. Howard Fox, Mr. W. Cole Pendarves, Mr. George H. Fox, and Mr. F. G. Enys, assembled at the office, when Lord

Mount Edgcumbe on behalf of the Polytechnic Society presented a memorial to the Meteorological Council, which was followed by speeches from several of the delegates urging the importance of retaining the Falmouth Observatory. A few days after Professor J. Couch Adams forwarded to the Council, at their request, his views on the subject in writing. The general question of the discontinuance of the Annual Grants to the Observatories by the Meteorological Council was also taken up by the British Association for the Advancement of Science, at their Meeting at Southport in the month of September following, and fully discussed under Section A. A strong memorial on the subject was drawn up by a Committee specially appointed, which was accepted by the Committee of the Section, and afterwards forwarded by the Council of the British Association to the Meteorological Council. No decision having been arrived at when the Meteorological Council dispersed for their holidays, the matter stood in abeyance until late in the autumn, when on the 16th November the Council forwarded an official minute, explaining their reasons for determining to close some of the Observatories, and stating that they would be prepared to consider any proposals which the Society might wish to make respecting the erection of a New Observatory at Falmouth. Your Committee being desirous of removing every obstacle in the way of the retention of a first-class Observatory at Falmouth, now applied themselves to the question of a new building, and after giving the matter very careful attention, and at the invitation of the Council sending a representative to London to discuss the matter fully with them, (Mr. Howard Fox kindly undertaking that duty,) decided to accept the conditions offered, and to take steps for the erection of the new building, if the Council would select a site in the neighbourhood of which they might approve.

On the 14th December their Secretary came down and inspected some available sites, one of which, situated to the westward of the present Observatory, and near Belmont, will probably be selected. In the meantime a calculation has been made of the quantity of land necessary for the purpose, and application made to Lord Kimberley for favourable terms to enable your Committee to carry out the proposal. His Lordship has been pleased to grant the freehold of the site, consisting of one rood and twenty-two perches of land, for the sum of £310, and has promised a donation of £30 towards the purchase fund.

The readiness and unanimity with which Noblemen, Members of Parliament, many leading scientific men and other gentlemen, in and out of Cornwall, came forward in response to the Society's invitation, to aid in endeavouring to retain at Falmouth the Observatory which has for so long a time been associated with it, has been the source of the greatest gratification to your Committee. They feel that their labours have been supported in a manner which has earned the heartiest acknowledgment, evincing, as it has done, a high appreciation of the services the Society has rendered in the past, and helping to secure even greater success in the future. Your grateful thanks are due to these gentlemen for the valuable and timely aid which they have thus rendered to Falmouth and to Cornwall, and especially to Professor J. Couch Adams, F.R.S., Professor W. Grylls Adams, F.R.S., and Mr. A. Pendarves Vivian, M.P.

Dr. Barham has recently called the attention of your Committee to the facilities which the towns of Truro, Redruth, Camborne, and Penzance, now afford for instruction in Science and Art, by having well equipped Laboratories and Lecture Halls, and a staff of competent instructors. He has suggested that the Polytechnic should co-operate with these towns in the imparting of scientific instruction, by arranging for a series of technical lectures at Falmouth in conjunction with them.

It only remains for your Committee to record the loss which the Society has sustained during the past year in the removal by death of several of its valued friends. First in chronological order is the name of General Sir Edward Sabine, K.C.B., F.R.S., who was for many years an honorary member, and through whose instrumentality, chiefly in recognition of the services rendered to science by the late R. W. Fox, F.R.S., Falmouth was selected as one of the stations for a first-class Observatory. It is a remarkable coincidence that the death of General Sabine was recorded in the morning papers in London on the day that the deputation waited on the Meteorological Council to urge the continuance of the Observatory, which he did so much to establish. In October last came the death of Dr. Hudson, of Redruth, a gentleman who took a lively interest, not only in the Polytechnic Society, but in the general advancement and dissemination of science, and whose early removal from a sphere of active usefulness will be deplored throughout Cornwall.

In the following month passed away a distinguished honorary member, Sir C. W. Siemens, D.C.L., LL.D., F.R.S., President of the British Association, principal in the well known firm of Siemens Bros. & Co., Electrical Engineers, who so kindly exhibited such a complete collection of Electrical Instruments, &c., during the Jubilee Exhibition. Two subscribing members, viz., Rev. J. Daubuz, of Killiow, and Mr. C. W. Reynolds, of Trevenson, were taken from us in the same month.

Then almost with the close of the year came the death of Mr. Richard Taylor, F.G.S., a gentleman to whom the Society has been very deeply indebted from its very commencement. For 37 years he acted as Honorary Secretary, and throughout the 50 years of the Society's existence he was rarely absent from the annual Exhibitions, where his frequent practical addresses on various topics, and in particular those connected with metal mining—in which industry he was largely interested, not only in Cornwall but in various parts of the world—always commanded an attentive hearing, and were highly valued. Mr. Taylor was elected President in 1877, which office he held for the usual term of three years, and was a Vice-President during the succeeding three years. His last appearance amongst us was at the Jubilee celebration, and he would have joined the Deputation to the Meteorological Office in June last, but for important business engagements on that particular day, which could not be set aside. Mr. Taylor was a substantial subscriber to our funds, as well as an active worker, and through his influence several annual donations from Mines have been received for some years past.

By the rules of the Society four of the Vice-presidents retire this day from office, and are not eligible for re-election, viz. :— The Rev. Sir Vyell Vyvyan, Bart., Mr. Leonard Courtney, M.P., Mr. J. H. Collins, F.G.S., and Mr. F. G. Enys ; to fill their places your Committee would recommend the election of the Right Hon. Earl of St. Germans, Professor W. Grylls Adams, F.R.S., Mr. J. C. Kennerley, and Mr. R. J. Frecheville, F.G.S.

The Royal Presentation Copy of the Jubilee Report.

The following is a copy of the letter from the President, the Earl of Mount Edgcumbe, accompanying the Presentation Jubilee Report forwarded to the Queen; and of her Majesty's most gracious Reply:—

FALMOUTH, NOVEMBER 15TH, 1883.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

MADAM,

The Royal Cornwall Polytechnic Society, with which Institution your Majesty and Royal Ancestors have been graciously identified from its beginning, venture to approach the Throne, and offer for your gracious acceptance the accompanying record of their "Jubilee," the success of which was in no small degree ensured by the liberal patronage of your Majesty, and His Royal Highness the Prince of Wales, and our own Duke. We venture to hope that the humble volume may serve as a reminder of happy days passed years ago along our Cornish coast, and amid scenes in our immediate vicinity, touchingly recorded by your own Royal hand.

Praying that your Majesty may long be spared to exercise your beneficent rule, and that the Almighty may continue to protect you, and shower down His Blessings upon you.

We remain,

With the profoundest veneration and respect,

Madam,

Your Majesty's most faithful subjects,

(Signed,) MOUNT EDGCUMBE,

President.

HER MAJESTY'S REPLY.

WINDSOR CASTLE, NOVEMBER 25TH, 1883.

General Sir Henry Ponsonby is commanded by the Queen to thank the members of the Royal Cornwall Polytechnic Society for the kind and loyal terms in which they have addressed Her Majesty in forwarding the record of their "Jubilee."

The Queen hears with much satisfaction of the success of the Society, and desires to express her earnest hope that it may long continue to prosper.

THE FIFTY-FIRST EXHIBITION

Of the Royal Cornwall Polytechnic Society, opened on Tuesday, September 11th, 1883. There was a very large and influential attendance, including the Earl of Mount Edgcumbe, President; Lord Robartes, Sir John St. Aubyn, Bart., M.P., the Rev. Canon Rogers (ex-president), Col. Tremayne, Dr. Barham, F.M.S., Dr. Jago, F.R.S.; the Revs. Canon Phillpotts, F. R. Hole, B. Christopherson, J. S. Tyacke, A. H. Malan, W. Rogers; Messrs. Digby Collins, T. S. Bolitho, Sydney Hodges, M. H. Williams, Warington Smyth, F.R.S., E. Parkyn, Robert Fox, Howard Fox, F. W. Michell, G. H. Fox, F. E. Fox, F.R.G.S., W. L. Fox, F.M.S., R. G. Cheesman, E. D. Anderton, E. Bullmore, J. H. P. Bennetts, W. M. Grylls, W. Husband, J. Poole, E. Handcock, S. Bennetts, R. H. Williams, W. N. Carne, W. Brooks, H. Tilly, H. S. Stokes, G. H. Eustice, W. S. Olver, J. Stephens, N. Sara, W. Sisson, J, Hosking, C. Davidson, W. J. Genn, A. Willmore, R. Rogers, G. Lanyon, T. Hart, F.S.A., W. Boase Smith, F.S.A., H. M. Jeffery, F.R.S., R. N. Worth, F.G.S. (curator), E. Kitto, F.M.S. (secretary), and a number of ladies.

With the single exception of the previous — the Jubilee Exhibition—the Mechanical Department was the largest and most varied in the experience of the Society, and a very large proportion of the exhibits, including all the heavier machinery, was displayed in a capacious shed at the Docks, where it had been arranged that trials of pulverisers and rock-drills should take place. Though thus relieved of what in reality constituted an exhibition in itself, the capacity of the hall was tested to the uttermost, and it was stored in every part with a very interesting display. The centre of the room was occupied by a handsome terra-cotta fountain, and prominent features in the area were also a fine marble bust of the late Mr. R. W. Fox, by Mr. Burnard, which was placed in front of the platform, and a graceful statue of "Christ and the Child," by Mr. Harry Hems. The Photographic display in the large room upstairs was even finer than that of the preceding year.

THE PRESIDENT'S ADDRESS.

The **President** delivered his address at one o'clock. He said: I believe it is the duty of the person who occupies the position I do this day, to open the proceedings with what are called a few appropriate remarks. Whether my remarks will be appropriate is a doubtful question, but they will, at any rate, be few. In the first place, I have to thank the Council of the Royal Polytechnic Society for having selected me as president this year. I have to express the pleasure it gives me to be associated as president with this Institution, which has for the past fifty years done so much to encourage and to lend help to the industries and arts of the county of Cornwall. I have also to congratulate the Society on the present exhibition. After the special effort which was made last year to commemorate the jubilee—the fiftieth anniversary—of the Society, it might reasonably have been expected that there would be something of a reaction this year, and a falling off in the exhibits. This, I am pleased to say, is not the case. (Applause.)

Certainly it is not the case in the most important branch of the Society's work—the Mechanical Department. (Applause.) Among the exhibits in this department the chief portion are from Cornish exhibitors. (Applause.) It is considered to be a remarkably good exhibition, and contains more novelties than have been recorded in any previous year. (Applause.) I will only mention a few of the subjects regarding which exhibits have been sent. There are a large number of ventilators for houses, public buildings, and, what is most important, for ships. That is a most important matter, especially in these days of steam, when the stokehole is such an important part of our vessels. I cannot but take an interest in this question from a recollection of the interest which my father used to take in it. (Applause.) My father was, as many may know, confined to his room for many years, and as he had an active mind his thoughts were constantly turning to matters which he considered of interest to those about him. (Applause.) The subject of ventilation occupied his attention very much, and I have piles of copy-books filled with notes written at my father's dictation on that subject. Of course my father was not a practical engineer, and I do not know that anything he thought of or proposed was really carried into execution; but I believe that if we compare dates we shall find that some of the contrivances now in use had at least been anticipated by him. (Applause.) Some of the exhibits in this section are most ingenious, and especially so one—which I advise everyone to look at carefully—which secures the full ventilation of ships in bad weather, by a very ingenious arrangement of a valve which closes when water comes into the opening.

But it is natural that in this county the most interesting of the exhibits should be connected with our great industry of mining. The objects of these may be summarised as referring to the increase of returns, and the protection of men from risk. It has only been during the last few years that the use of the skip for men ascending and descending the mines has been in vogue in Cornwall. A few months ago I alluded to this at the meeting of the Royal Institution, and spoke of it as one of the modern advantages in mine working. But I had scarcely done so when the fearful accident happened at Wheal Agar, in which a dozen men were instantaneously killed by the breaking of the rope. This threw a sadness over everyone in the county, and it was felt, therefore, that inventions to obviate such an accident in future should be among the exhibits found here. (Applause.) The principle of most of the inventions exhibited is that as soon as the upward pressure of the rope is removed catches fly out and stop the descent of the skip. This is not a new idea. It has been in use in coal mines in various parts of the country for years. But there is a great difficulty in the case of the Cornish mines, for the appliance must be made both applicable to the gear and fittings of the mines, and also to the shafts, which vary according to the underlie of the lode. I believe none of the exhibits have been considered by the judges fully to meet the great difficulty of the case, but I am quite sure exhibitors will be encouraged to develop their contrivances to something which will meet this great danger. (Applause.)

As regards the increase of returns, there are various pulverisers, which are most curious and valuable in their construction. They are intended to render thoroughly productive the "rows" and "leavings" of the tin ores and are, I believe, considered to be of great utility. This is the first year there has been introduced competitive trials for these machines, and to see them at work it will be necessary to go to the docks, where steam power is in use.

Most of the rock-borers exhibited have been seen here before, but there is one instrument connected with them this year, which has awakened much interest, and that is the hydraulic car for driving levels, adits, and tunnels, exhibited by Messrs. Hathorn and Co. By means of this invention the borers are carried along the level, and fixed firmly by hydraulic pressure against the sides and roof.

There is also a new stamps of a most ingenious character, exhibited by Mr. Husband, of Hayle, which has been in use at

Tregembo mine—the patent oscillating cylinder stamps, which embodies a new mechanical principle. It does an immense amount of work, much more than any other stamps, and the wearing in the stamps-head of one ton of iron will stamp 1,200 tons of stuff, while in any other stamps it will only stamp 200 to 300. I am sure I shall only be expressing my sentiments when I speak in terms of praise of the valuable services rendered by Mr. F. W. Michell in this department. (Applause.)

With regard to the Fine Art exhibition of this year, it is said that it is not quite so full or equal in quality to some preceding years, but I may assure my hearers at the same time that they will find it well worthy of inspection; and there are among the pictures many which I should only be too glad to win in the Art Union. Landscape, of course, forms the principal subject of the pictures. The features of a country determine its art, and Cornwall, with its rugged moorlands of different colours; the fishing villages with their brown sails and hardy seamen; its yellow sands, and the green sea breaking against its granite walls; naturally developes and moulds the artistic genius of its people. (Applause.) It is not for me either to select or criticise. The judges have done that, and visitors must use their judgment also. Although no one would wish to see the artistic genius of the district diverted from its proper channel, yet we are pleased to see other branches of art represented here. We are all pleased to see the careful tinting of some pictures by Mr. Opie, our old Cornish artist—(applause)—and I do not think I shall be travelling out of my way if I call attention to the artistic drawing and masterly feeling displayed in Miss Eastlake's chalk sketches. She has just stepped over from the position of amateur to that of professional, a position of which she is well deserving. (Applause). We shall also thank Mr. Dicksee for giving us the temporary pleasure of admiring his exquisite picture of the Italian girl, which he has termed "The Alien." Many will look upon that picture with admiration and envy. (Applause.)

What I have said of the effect of the beauties of the county upon artistic taste, does not merely affect those who have made art their profession, but it is also visible among the amateurs. The amateur work before us is very good. I will not venture to say anything about the landscapes, but I think I may call attention to the careful study and evident promise of the figure works by Miss Constance Hill, the daughter of a clergyman in this county. (Applause.) I am also glad to see that the sister art of sculpture is represented here. The work by Mr. Harry Hems, "Christ and the Child," has both grace and dignity to recommend it, and the bust of the late Mr. Robert Were Fox, by Mr. Burnard, occupies a place of honour which not only as a work of art, but because of the original, it deserves well. (Applause.) Mr. Fox was a great supporter of this institution, and all those who knew anything of him will think of him with affectionate regard and regret. (Applause.) I once had the happiness and honour of being received by Mr. Fox, at Penjerrick, when he was unable to walk, but was carried about to show the beauties of that little paradise, and that day has always been cherished in my memory with affection and esteem.

I cannot pass over the Photographic display. Whether the quality of artistic work be regarded as showing what is in the artist, or for the interest it has on the beholder, one of the greatest things in an artist is the power of selection and grouping. That must form part of a photographer's qualifications, and although to a certain extent we may regard photography as mechanical work, yet it must have the hand of nature, and also the selection of the artist. As regard the power of selection and composition, there are works in the exhibition which are of the highest character. One I may especially notice without invidiousness because it has gained a prize, viz., Mr. McLeish's "Misty Morning on the Weir," in which is a view of Durham Cathedral. That is a fine example of happy selection and artistic feeling. Then there are other wonderfully good specimens of careful grouping. Those of Mr. Robinson and other figure subjects show a great advance in that branch of the photographic art. But there is another quality which artists will give photography credit for, and that is the taking of instantaneous pictures. In that way it will be a most useful handmaid to art in taking moving figures. In this section we have some wonderful and most interesting works by Cobb and Son, of London, called "The Streets of London," which were photographed from the top of an omnibus as it went along. There is also a beautiful series representing Henley regatta, and the Rev. A. Malan, a Cornish clergyman, exhibits photographs of express trains, photographed as the train rushed through a station. There are likewise several specimens of improved apparatus, which all who take an interest in the subject would be glad to see. There has been one failure in photography, and that is its too frequent fading character. This is, of course, owing to the neglect, if not the dishonesty, of the operator. If anyone has photographs that fade now-a-day, they ought to denounce the persons who supplied them. (Hear, hear.) On the whole, the photograph exhibition is not only the best we have ever had, but the best out of London in this country. For this we have to thank Mr. Brooks, and I hope another year we shall have some American views, inasmuch as I understand Mr. Brooks is in communication with American photographers, endeavouring to get them to compete.

There are many good specimens of Ornamental Art, and that is a department in which I take a deep interest. The influence of art, if it really exists in a people, can be seen in everything they make. Anything which encourages art in the every-day comforts of civilised life is not by any means to be despised—(applause)—and in this hall we see in great variety the various methods and new ideas of those who wish to utilise art in that respect.

I am sorry to see so little here connected with the Fisheries Exhibition. I had hoped that some of the ideas that have been brought to light in the Fisheries Exhibition in London would be seen here, but almost the only thing I notice is the floating breakwater.

There is one branch of the Society's useful work which of late has been in jeopardy—I mean its Meteorological Department, the Observatory. The Observatory, with all its costly instruments, has been kept going by a grant from the London Meteorological Society. That Society has determined to reduce the number of stations, and Falmouth is one which it is said will be done away with. This I regret, not only because of the injury it would do to the county, but to the captains of vessels, who frequently put in at Falmouth hoping to receive information which would affect the remainder of their voyage. A deputation from the Falmouth Society waited on the Council of the London Society in June last, and did all it could to put the case fairly forward, and it was decided that we should receive some further communication. No further communication has been received as yet, but we are promised one as soon as the Council has completed its holiday next month.

In conclusion I may say that I take great interest in the scientific societies of the county, and that I think there is a great advantage in these societies having some common link together. I have the honour of holding the office of president of two of the societies, and any assistance which I can afford I shall only be too happy to render. (Applause.)

SIR JOHN ST. AUBYN said: I feel very much flattered at being requested to undertake the pleasing duty of proposing a vote of thanks to the Earl of Mount Edgcumbe, both for his kindness in accepting the office of president of this Society and for the admirable address to which we have just listened. Lord Mount Edgcumbe has in that address adequately fulfilled one of the principal duties of the president, by pointing out the various objects of interest which are gathered together here, to which it is desirable our attention should be directed ; and there are one or two points on which he has touched in which I should like to follow him. Lord Mount Edgcumbe has referred to the absence of many exhibits connected with the fisheries. There are but few articles here of that description, but I suppose the reason is that most of them have been sent to London and are now being exhibited there. The Cornish exhibits at the International Fisheries Exhibition are not quite so numerous as we could have wished; so far as they go, however, they are complete, and reflect great credit on those upon whom devolved the work of organising and sending them up. (Applause.) As a member of the Executive Committee of the Fisheries Exhibition, I have within the last few days received a letter from the president, stating that it is proposed to bring over from America an American fishing schooner, fitted with a particular purse seine which has been worked most successfully in American waters, and which, probably, could be adapted to the pilchard and herring fishery. It is proposed to bring it over at the sole expense of the Fisheries Exhibition, and send it round the coasts of England, and exhibit to our fishermen the mode in which the seine is worked. (Applause.) I have been requested to ascertain whether the Cornish fishermen would like to have it sent around the Cornish coast. (Applause.) Since receiving the letter I have seen Mr. Cornish, the secretary of the Cornwall County Committee, and Mr. Cornish informed me that he had arranged to call a meeting next week. I hope the offer of the Executive Committee will be accepted, and that on behalf of the county the Cornwall Committee will express a wish that the Cornish fishermen may have an opportunity of seeing the seine worked. Perhaps it is not a proper thing for me to say at this meeting, but in all probability Falmouth will be thought the most favourable place for the trial of the experiment. (Applause.)

Lord Mount Edgcumbe has also made reference to the Falmouth Meteorological Observatory, and I am afraid the concluding sentences of our President's remarks are likely to come true. I hope they may not, but that the London Society will find it consistent with the duty which it owes to the science of the country to continue that support which it has hitherto given to the Observatory at Falmouth.

Lord Mount Edgcumbe has referred in graceful terms to the bust of Mr. Robert Were Fox, and I cannot refrain from referring to the loss which the county sustained when Mr. Fox was taken from us. (Applause.) Persons who traced the immense stores of knowledge which were veiled and half-hidden under his modest exterior; who were familiar with his kindly manner, his geniality, his readiness to assist all who approached him, and his desire to impart knowledge for the benefit of his native county; are never likely to forget the impressions made upon them by Robert Were Fox. (Applause). It is a consolation to us to know that his name is not extinct, and that as long as this Society exists there will always be some of the name of Fox connected with it. (Applause.)

With regard to Lord Mount Edgcumbe and what he has done, we all feel under a great debt of gratitude to him for having accepted the office of president. This Society has had a grand and prosperous career. We hope that prosperity will be prolonged in the future, and we feel sure that if it is it will be mainly owing to the support and encouragement which the Society receives from gentlemen in the position of Lord Mount Edgcumbe. (Applause.) We thank him for coming here this day and for addressing us, and we are pleased to know that this is not the last occasion on which he will address us. (Applause.)

Mr. **WARINGTON SMYTH** seconded the resolution: There is a great deal here which challenges one's attention in many departments of art and science, applied to our everyday work in mining and other portions of actual life, and there is one subject upon which I would wish to enlarge for a short time, because I think there is reason for so doing, in consequence of the terrible accident to which Lord Mount Edgcumbe referred, at Wheal Agar mine. (Applause.) A great interest, and I might say an almost sacred interest, is felt in the risks which miners are subjected to by the new appliances for lowering them to their work, and raising them thence, by means of the rope and cage. I have had a long experience amongst the different mines of Great Britain, and have seen most of the methods employed in various parts for getting over the difficulty of the serious labour, and the frightful detriment to health, which is incurred in consequence of the men having to travel a distance of hundreds of fathoms to their work, and raise themselves to that height in coming from their work to daylight. Among these various methods it is a great satisfaction to know that to the Royal Cornwall Polytechnic Society we owe the introduction of that excellent invention—the man-engine. (Applause.) Those who have travelled through our mines will scarcely require to be reminded of the excellence and comparative safety of this contrivance. (Applause.) They will gratefully remember having seen the miners come to surface scarcely inconvenienced, as contrasted with the frightful labour which climbing from a hot mine imposes upon them. The man-engine, with the slight qualification of one instead of two rods, has been applied to a great many of our mines, and probably if more attention had been paid to the regularity of the sinking of shafts it is not at all unlikely that more man-engines would have been erected. Indeed, if the shareholders in our mines had more knowledge of the mines and more feeling for the men employed, as well as a better insight into the various means by which they could economise their resources, I would make bold to say that there would be many more man-engines. (Applause.) Failing this, the mode which has been employed is that of applying the rope by which the ores are raised to the surface, in the raising of the cage with the men, thereby trusting to the character of that rope for bringing the men up and lowering them in safety. Unfortunately we have had in Cornwall two examples, terrible in their kind—one at Botallack, and a second which has occurred so recently that it is fresh in our memories—showing the great danger incurred by the adoption of this system; and it is one of the great advantages of this Institution that it has obviously excited men's minds, and aroused the feelings of those who felt that it was their duty to devise methods by which they hoped such accidents would be averted in future. We have seen here to-day apparatus of the same kind as that first brought forward at the Great Exhibition in 1851. Those who can look back to that Exhibition will remember that a mechanician of French origin, named Fourdrinier, brought forward an extremely pretty apparatus, in which it was intended when the strain of the drawing rope was removed to at once bring into action an arrangement which would clamp the cage firmly in its place. That apparatus was erected in a good many mines at the time; but we must recollect that the shafts of the coal mines, and the shafts of Cornish metalliferous mines are very different; one is perpendicular and the other inclined—very much inclined sometimes—in various directions. Consequently the apparatus which may be adopted with comparative facility and comparative security in one case cannot be applied under the same favourable circumstances to the other. The inclined shaft occasions considerable wear and tear to various parts of the rope, and it should also be remembered (what I do not think has been sufficiently regarded of late) that the ropes used in Cornish mines are subject to the influence of acids in the water, and therefore the wear and tear are likely to be greater. Corrosion is likely to proceed at such a rate that the ropes require to be continually looked at, and protected in many cases from the action of the "strong water," as the miners call it. This clearly proves that the first and most important matter is careful attention to the rope—(applause)—first as to the material, and then as to its preservation. As regards the mechanism to be brought into work in case a fracture of the rope should take place, at least 50 different kinds of apparatus have been introduced, and many of them erected at collieries in England, as well as in Prussia, Belgium, and France. The reason why I take occasion to occupy your time for a few moments on the subject is that I think some good may be done by pointing out the defects in some of those machines. (Applause.) Many of the various classes of machines have been used for years; but, strange to say, if you go into the very collieries where these machines were introduced 20 or 30 years ago, you would now find them all swept away, simply because the rate of speed at which the loads are raised and lowered in these collieries is so great that the ropes are apt to make a surge, and relax the tightness of the levers; then the levers, being brought into play when they are not required, produce some of the very chances of accident which they are intended to avert. That is the reason why in a great many instances these machines have had, after a fair trial extending over several years, to be set aside. Next comes the question as to whether in Cornish mines the rate of speed of raising and lowering the cage is so considerable as to prevent the application of such apparatus. As a rule we may hope that inasmuch as the rate of speed is less, inventions of the kind to which I have referred might meet here with a more favourable reception, and a more enduring application. (Applause.) In some of the collieries the velocity of the ascent and descent of the cage is 400 fms., or 2,400 feet, in less than a minute. I have many times been raised that distance in 55 seconds—in fact, it was almost like being shot out of a gun—but in consequence of the admirable system which is observed in the daily examination of the ropes and machinery, the colliers trust to this care, rather than to any of those contrivances which might introduce the risk which they sought to avoid. Hence, I think it a hint useful to those who are endeavouring to invent some safe method to mention that, inasmuch as the speed in Cornish mines is comparatively moderate, there are contrivances which have been thrown aside in the colliery districts, which might possibly be introduced in Cornwall. (Applause.) If the question is taken up by this Institution, and followed up by a careful study of the contrivances introduced in other places, a great deal of good may be done in obviating the risk—which is seen to be one attended with the saddest results—which has attached itself to all attempts that have been made to lessen the fatigue and prolong the lives of those valuable men, the Cornish miners. (Loud applause.)

The EARL OF MOUNT EDGCUMBE, in acknowledging the compliment, said with regard to Sir John St. Aubyn's remarks as to the fishery exhibits, that he knew many articles which would have been there were in the London exhibition : in fact, he had received communications from one or two parties, who stated that they would have been glad to send some exhibits there, but were compelled to allow them to remain in London until the exhibition was closed. He sincerely hoped that the exhibits of safety cages would lead before long to a solution of the difficulty, which was clearly one of the most interesting topics of that day's meeting. (Applause.)

This concluded the opening proceedings.

Judges' Reports.

MECHANICS.

SECTION I. ROCK DRILLS, GAS ENGINES, STEAM ENGINES, AND BOILERS AND MACHINERY CONNECTED THEREWITH.

SECTION II. SANITARY AND DOMESTIC INVENTIONS AND IMPROVEMENTS.

SECTION III. OTHER BRANCHES OF MECHANICS.

JUDGES :—*Mr. E. D. Anderton, Chairman ; Capt. J. Hosking ; Messrs. G. H. Eustice, N. Fox, James Hosking, W. Husband, C.E., F. W. Michell, C.E., W. Slade Olver, J. Pool, W. Sisson, M.I.M.E., N Sara, R. H. Williams.*

The Judges in the Mechanical Section are pleased to be able to report that there is not only a large entry, but one of unusual variety and excellence, and displaying an exceptional number of original features. All the available space in the hall is thoroughly occupied, and there is a large and valuable display of the most practical character at the Docks, where the trials of the borers and pulverisers are arranged to come off. Mr. Newton, who has received several medals from the Society for his inventions and manufactures, is highly commended for the ingenuity and workmanship of his combined theodolite, miner's dial, and dumpy level. To Mr. Ford's model steam engine, £1 is awarded for excellence of workmanship. Messrs. Davey, Sleep and Co. have a first bronze medal for their very simple and handy automatic belt fasteners. The Judges are glad to see such exhibits as the model of Nicholls's shaft at Violet Seton Mine, by Mr. J. M. Martin, which shews the increased attention which is being paid to the importance of improvement in pitwork and in shaft sinking. To Simmons and Co. a first bronze medal is awarded for their excellent steering perambulator. 10s. is given to Thomas Pope for the ingenuity for his invalid bed and chair. Some tasteful and practical examples of the Bower-Barff process of protecting iron from rust are shewn. First bronze medals are given to Mr. R. W. Tayler's automatic safety shield for circular saws, and to his patent fuel economiser for Lancashire or Cornish boilers, an adaptation of an excellent principle. The Society has never had a larger and better entry of gas cooking and warming apparatus than that of Messrs. Wright, and a second silver medal is awarded. Mr. Cox's very handy, simple, and cheap griller has a first bronze medal. The microscopes shewn by Mr. J. Bickle are awarded a second bronze medal (convertible if desired) for their ingenuity and workmanship. Joseph Jobson has £1 for the workmanship of his model marine engine. Wells's oil feeders and lamps have a second bronze medal. Mr. Chappel's electric bell is highly commended. Mr. Sinclair's "Fire Queens"—improvements on the well-known and approved Extincteurs—are highly commended; and first bronze medals are given to his hose-coupling; and to the examples of Warnerized goods, for this new process. The excellent slip hooks and harness snaps of Messrs. Alexander have a like award. Messrs. Lewis Olrick's self-feeding ratchet brace also has a first bronze medal. The exquisite examples of ornamental turning by Mr. E. F. Baker, have a second bronze medal, with leave to commute if desired. The beautifully made and highly ingenious dead-beat sectioner of Mr. J. P. Maginnis has a second silver medal. His universal sector is highly commended. The skip improvement and skip road in use at Pednandrea, is so ingenious and so practically useful, that Capt. James Thomas has a second silver medal. Messrs. Burdock, Griffiths, and Co.'s enamel paint has a first bronze medal. To the canvas valves of Mr. J. Mayne a first bronze medal is given for their durability and economy; they are made of canvas waste from the manufacture of tin sacks. The large and attractive display of bicycles and tricycles of Mr. Newton is highly commended, for the excellence and thoroughly representative character of the exhibits. The thanks of the Society are heartily due to Mr. F. W. Michell for his highly interesting working model of the old Newcomin pumping engine, and £1 is voted to the maker, Mr. Bowden. Messrs. Bolling and Lowe's portable railway is highly commended. To the practical and valuable hydraulic car for driving in tunnels and levels, by Messrs. Hathorn and Co., a second silver medal is awarded. The "Acme" fresh water condenser of Messrs. Fraser in considered a very valuable invention, and has a first silver medal. The Judges are glad to observe such a very large display of exhibits connected with ventilation. To Messrs. Boyle and Messrs. Lamb, for their ventilating apparatus as applied to buildings on land, first bronze medals are awarded. Mr. Utley, for his arrangements for ship ventilation, which provide adequate access and egress of air in heavy weather, when ventilation is most needed, has a second silver medal. Mr. Husband's patent oscillating cylinder stamps, which embodies an entirely new feature of mechanical arrangement, and which is working with great efficiency at Tregembo, is awarded a first silver medal. The Judges are pleased to note so many entries of plans for securing the safety of skips and cages, though they do not think either of them a satisfactory solution of the problem. The principle of Mr. Matthew's plan is approved, but in its present state it is not adapted to Cornish mining. Mr. Richards's plan is undoubtedly effective, but also not suited to the county. Mr. Bosisto's is simple, but faulty in detail. Mr. Tregoning's catch operates well in model, but has evidently not sufficient grip to maintain its position when loaded. The best plan shewn is undoubtedly that of Mr. Bennetts, which was used in South Frances nearly a quarter of a century ago. It has now been modified and improved; but the judges are satisfied that several practical improvements can be made further. They hope no time will be lost in pursuing this important subject to a practical issue. A first silver medal is awarded to Messrs. Crossley's "Otto" gas engine; and a second silver medal to Davey's differential engine gear. The Judges commend the work done by Messrs. Glover and Hobson's hand-power drill, but consider further alterations necessary to make it worthy of the Society's award. The results of the trials of Rock Drills and Pulverizers are given under separate heads. The thanks of the Society cannot be too heartily given to Mr. F. W. Michell for his unwearied efforts in securing the efficiency of the Mechanical Department.

TRIAL OF PULVERIZERS.

The competing machines were those of Messrs. Michell and Tregoning, of Redruth, of Capt. Nicholas, of West Basset Mine, and of Mr. Arundel Pryor, of St. Austell. Each in turn was worked by the same steam engine, and the coals consumed carefully weighed. The trial was, first, Grinding Burnt Leavings, one hour each; and secondly, Grinding Roughs, one hour each. Before bruising, the Burnt Leavings assayed 6 lbs. of Black Tin per ton, and the Roughs 2 lbs. per ton, without the use of the hammer in the assays.

On the Burnt Leavings, Michell & Tregoning's Pulverizer, with a consumption of 1 cwt. of coal, pulverized 6 cwts. 2 qrs. 13 lbs. of stuff, so that 57 lbs. of Black Tin per ton could be washed therefrom without further bruising, equal on the quantity bruised to 19·25 lbs. of Black Tin. On the Roughs, with a consumption of 2 qrs. 3 lbs. of coal it pulverised [illegible] cwts. 3 qrs. [illegible] lbs., so that 16 lbs. per ton could be washed therefrom without further bruising, equal on the quantity ground to [illegible] lbs. of Black Tin.

The work done by this Pulverizer in the two trials was therefore sufficient to produce from 3 cwts. 1 qr. [illegible] lbs. of stuff, [illegible] lbs. of Black Tin by the consumption of [illegible] lbs. of coal.

Capt. Nicholas's Pulverizer on the Burnt Leavings by a consumption of 3 qrs. 23 lbs. of coal pulverised 7 cwts. 2 qrs. 12 lbs. of stuff, so that 41 lbs. of Black Tin per ton could be dressed therefrom, equal to 15·57 lbs. Black Tin on the quantity bruised. On the Roughs this Pulverizer, with a consumption of 2 qrs. 21 lbs. of coal, pulverized 3 cwts. 3 qrs. [illegible] lbs. of stuff so that [illegible] lbs. of Black Tin per ton could be washed therefrom, equal to 3·[illegible] lbs. on the quantity bruised.

The work done by this Pulverizer in the two trials was therefore sufficient to produce from 11 cwts. 1 qr. [illegible] lbs. of stuff 18.97 lbs. of Black Tin by a consumption of 184 lbs. of coal.

Mr. Pryor's Pulverizer on the Burnt Leavings, with a consumption of 2 qrs. 21 lbs. of coal, pulverized 5 cwts. 1 qr. 15 lbs. of stuff, so that 19 lbs. of Black Tin could be dressed therefrom, equal to 5.1 lbs. of Black Tin on the quantity ground. On the Roughs, this machine, with a consumption of 21 lbs. of coal, pulverized 2 cwts. 2 qrs. 4 lbs. of Stuff so that 14 lbs. of Black Tin per ton could be washed therefrom, equal to 1·8 lbs. of Black Tin on the quantity ground.

The work done by this Pulverizer in the two trials was therefore sufficient to produce from 7 cwts. 3 qrs. 19 lbs. of stuff, 6·9 lbs. of Black Tin by a consumption of 98 lbs. of coal.

The above results shew that the quantity of Tin obtainable by the consumption of 1 lb. of coal was in the case of Messrs. Michell and Tregoning's Pulverizer, ·125 lbs., Capt. Nicholas's Pulverizer, ·103 lbs., and Mr. Pryor's, ·070 lbs.

The first silver medal of the society is awarded to Messrs. Michell and Tregoning, for the result of the test.

The engine which supplied power, was under the superintendence of Messrs. Harvey & Co., of Hayle, during the contest, except on the last day, when it was superintended by Mr. Nicholas Sara. The samples were taken by Mr. Sweet, of Carn Brea, and Mr. Piper, of West Francis, who were on the spot during the whole of the time the trials were conducted.

TRIAL OF ROCK DRILLS.

The competing machines were the "Excelsior," the "Stephens," and the "Eclipse."

An attempt was made to have the trial at the Falmouth Docks with steam, but it was found that the pistons of the Excelsior and the Eclipse were too well fitted to their cylinders to run with steam, and the pipe for conveying the steam having proved defective, it was decided, through the kindness of Capt. Bishop, to transfer the trial from Falmouth Docks to East Pool Mine, in order that compressed air might be used, for which the machines are designed.

At East Pool the test was speed in boring. Each machine to bore one hole, in size equal to $\frac{1}{4}$ of the area of its cylinder, and to use Compressed Air of the uniform pressure of 65 lbs. per inch. The results were as follow :—

The Excelsior, 4 inch cylinder, commenced with a bit $2\frac{1}{16}$ inches in diameter and bored 19 inches, when the bit was reduced to $1\frac{11}{32}$ inches. Another bit was then used, commencing at $1\frac{9}{16}$ inches, which, after boring $14\frac{1}{2}$ inches, measured $1\frac{8}{16}$ inches. Total depth bored, $33\frac{1}{2}$ inches in 6 minutes 30 seconds.

Stephens's machine, $3\frac{1}{2}$ inch cylinder, commenced with a bit $1\frac{25}{32}$ inches in diameter and bored 18 inches, when the bit measured $1\frac{18}{32}$ inches. A second bit was then used, commencing at $1\frac{9}{16}$ inches, which, after boring $15\frac{1}{4}$ inches, measured $1\frac{1}{4}$ inches. Total depth bored, $33\frac{1}{4}$ inches in 5 minutes 40 seconds.

The Eclipse, $2\frac{1}{2}$ inch cylinder, commenced with a bit $1\frac{17}{32}$ inches in diameter, which after boring 13 inches, measured $1\frac{16}{32}$ inches. A second bit was then used, commencing at $1\frac{3}{8}$ inches, which, after boring $13\frac{1}{4}$ inches, measured $1\frac{5}{16}$ inches. Total depth bored, $26\frac{1}{4}$ inches in 6 minutes 10 seconds.

The hole drilled by the "Eclipse" was greater in area than $\frac{1}{4}$ of the cylinder, whilst the holes drilled by the "Excelsior" and "Stephens" were under the required size. The rock cut by each was, "Excelsior," 67 cubic inches: "Stephens," 63·6 cubic inches; and "Eclipse," 41·7 cubic inches; equal to a hole of the specified ratio to the cylinder of 21.33 inches in depth, in the case of the "Excelsior," 26·44 the "Stephens," and 34 the "Eclipse."

The speed per minute at which each machine bored equal to a hole of $\frac{1}{4}$ the area of its cylinder, was, the "Eclipse," 5·51 inches, the "Stephens," 4·67 inches, and the "Excelsior," 3·28 inches.

A first silver medal was awarded to the "Eclipse" for this competition; and a first bronze medal was awarded to the "Excelsior," not for its part in this contest, but for the novelty of its principle. It is a valveless machine working expansively, and the Judges of Mechanics hope to see further development of this arrangement.

NAVAL ARCHITECTURE.

JUDGES:—*Messrs. H. B. Fox, Chairman; E. Handcock, F. Wymer.*

The Judges regret to note the smallness of the exhibition in this class, but are pleased to call attention to No. 151, a model lifeboat by Mr. E. Haly, which shews an improvement in the arrangement of the cork and the shape of the boat, whereby her buoyancy is greatly increased; they recommend it a second silver medal. Another entry by Mr. Haly, No. 152, is a very nice model of a small steamer for towing and carrying passengers, to which is awarded a prize of 20s. No. 155, Captain Heathorn's patent water brake, is an ingenious arrangement for stopping the way of a vessel by opening a double rudder, but the power required for the purpose appears to make it impracticable, whilst the great strain put upon the two rudders and their heads would make the officer in charge hesitate to risk a breakage in so important a part of the ship. 5s. is awarded to the model of mosquito boat No. 153.

FINE ARTS.

SECTIONS I. & II.	AMATEUR OIL PAINTINGS & WATER COLOUR DRAWINGS.
SECTION III.	AMATEUR PENCIL AND CRAYON DRAWINGS; ENGRAVING & ETCHING; LITHOGRAPHY, &C.
SECTION IV.	SCULPTURE, ARCHITECTURE, & ORNAMENTAL ART.

JUDGES:—*Mr. C. Davidson, Chairman; Mrs. Genn, Mrs. Fitz Gerald, Mr. G. W. Taylor, Mr. W. Boase Smith, F.S.A.*

The Judges regret that there are fewer entries than usual in the Oil and Water Colour sections by amateurs. Amongst Oils they are very much pleased with the figure subjects, and have awarded a first silver medal to No. 412, a portrait by Miss Constance Hill, which shews great power in the modelling and colour, as do also Nos. 418 and 420, by the same hand. To No. 416, Trevarrian Head, by Mr. W. C. E. Serjeant, a first bronze medal is awarded, for good feeling of atmosphere in the sky and distance. A group of flowers, No. 411, by Miss Fanny G. Barrett, is commended for truth and careful work. The Judges notice amongst the Water Colour work, No. 452, a view of Kynance (Mr. H. Preston), very good in colour and composition. It has a first silver medal. They have awarded a second silver medal to No. 478, Mr. J. O. Nash, for a fine view of Mullion, well carried out; and a second bronze medal to No. 451, a careful study of an old farm house and garden, by Miss Martha Pill. The Judges commend as very meritorious, No. 454, architectural subject, "Porta Ostiensis," by Mr. Samuel Kerswell; No. 458, a group of "May Blossom" by Miss Rachel James, showing much close observation of colour and tone; No. 457, St. Knighton's Kieve (Rev. J. Jane) for colour and tone, the drawing and choice of subject being less pleasing; and No. 476, "Heron and Falcons" (Miss Catherine C. Budd), a very careful drawing with chaste and harmonious colouring. They notice a very interesting book of sketches from nature, No. 493, by Miss Heaton; a portfolio of flower drawings, No. 494, by Miss Katie Robinson, aged 14; and Nos. 518 and 519, careful pen and ink imitation of engravings, by Messrs. Thomas A. Cook and G. A. Cook.

The Judges have awarded medals and prizes as follows to the

Paintings on China and Terra Cotta, &c.:—Misses A. R. Popham, Rosamond Eastlake, Petronella Trump, Barbara Hext, and Catherine C. Budd, first bronze medals; Ida C. Wickett, L. Brown, and H. Williams, second bronze medals; Mabel Bere, certificate of merit, Alice Bere, prize of 10s.; Mrs. Richardson, commended. To Mr. Harry Hems a second silver medal has been awarded for his "Christ and the Child." The Judges would here record their opinion that in this section the bona-fide fired porcelain work should rank far above the oil painting on terra cotta, which, indeed, is a style they would not encourage at all, and they suggest the suppression of the prizes offered for such work.

PHOTOGRAPHY.

PROFESSIONAL AND AMATEUR.

JUDGES:—*Messrs. Robert Fox, Chairman; W. Brooks, W. Naylor Carne, G. Lanyon.*

The Judges have great pleasure in congratulating the Society on the success of the display in the Photographic Department this year. The number of exhibits is unusually large, and there is also a very marked improvement in the quality and general excellence of the pictures submitted. The Judges wish specially to note the entire absence of anything approaching to careless or slovenly manipulation, which was very prevalent some few years since. In professional portraiture the exhibits are far below the average as regards numbers, but professional landscapes are exceedingly well represented; there are also a large number of instantaneous works, some of a very high degree of merit. The amateur work is likewise good. In the photographic appliance section there are some clever inventions and improvements, well worthy of notice: including several exhibits of lantern appliances, some of which are very ingenious.

PROFESSIONAL PHOTOGRAPHY.

The Woodbury Permanent Printing Company, of London, exhibit some important works of a very high order, notably No. 703—Madame Modjeska. They also exhibit two charming examples of enlargements on opal, very fine indeed. Mr. H. P. Robinson, of Tunbridge Wells, is very strong, and the Judges are pleased to note the marked improvement in his exhibits over last year. To his "Merry Tale" a second silver medal has been awarded. Mr. R. Slingsby, Lincoln, sends a similar class of works, several very clear. There are two exhibitors of lantern slides, Mr. P. H. Fincham, and Mr. G. W. Gwyre, whose productions shew clean and careful manipulation. They are mostly examples of wet collodion, which gives rather too cold a tone. Mr. Adam Distin sends three examples of his well-known style, the best of which is "Gloaming." Messrs. G. West and Son have a frame of studies of yachts, elaborately retouched. Mr. G. Higginson has two pleasing pictures, the "Lych Gate" and "An Old Watermill." Mr. F. M. Sutcliffe sends some of his charming little studies of shipping, &c., similar to those of last year. Messrs. Cobb and Son, of Woolwich, exhibit some extraordinary examples of instantaneous work, views of the streets of London, many of them taken from the top of an omnibus ; a second silver medal has been awarded. An old exhibitor, Mr. J. Milman Brown, has a first bronze medal for his picture "A Misty Morning. It shews great artistic taste, is full of atmosphere, and generally effective. Mr. R. Walter has a few careful little bits of Epping Forest. Mr. H. Chubb sends some effective productions in portraiture. Messrs. John Chaffin and Son's exhibits this year are somewhat heavy ; they would have been better had they received double the exposure. Mr. F. W. Broadhead is represented by two examples of portraiture, and a frame of views in Bradgate Park. The chief award in landscape is taken by Mr.

N. McLeish, who has a first silver medal for his charming and effective production, "A Misty Morning." Mr. Norman May is represented by several examples of very careful work. Mr. G. Renwick sends eight frames, all of snow scenes, and somewhat monotonous. The best of Mr. J. Jackson's examples is "An Old Norman Doorway." Mr. James S. Catford has some very pretty views, which shew careful study. Mr. W. J. Payne has a second silver medal for his excellent frame of panel portraits. The Judges would like to see a larger style of portraiture from him. Mr. Luke Berry sends a few illustrations of careful work; and Mr. E. S. Ellery, some creditable examples in portraiture. Messrs. Day and Son contribute specimens of vignette portraiture, very soft and delicate. Messrs. Johnson Brothers, Henley-on-Thames, exhibit some perfect specimens of instantaneous photography, "Henley Regatta." A first bronze medal has been awarded to No. 809 as the best. They have also some exceedingly good pictures of harvest fields, and the whole of their work is soft and delicate. Mr. F. Argall, Truro, contributes a capital enlargement, "Boathouse on the Fal." He also sends a good enlargement of Dr. Benson, Archbishop of Canterbury. Mr. W. M. Harrison, Falmouth, has some very pleasing specimens of fancy portraiture. Mr. W. W. Winter contributes a frame of cabinet portraits, which are in the opinion of the Judges spoilt by the mounting being too gaudy. Mr. Lyd. Sawyer has some pleasing out-door studies—"The Rivals" is the best. Mr. G. T. Whaite sends several frames of his well-known studies, which are well worthy of attention.

AMATEUR PHOTOGRAPHY.

Some very interesting pictures of life and scenery in the wilds of Labrador and Ungava, by Mr. J. R. Holmes, receive the first bronze medal. The manipulation is very good, considering the difficulties under which they must have been taken. Mr. J. G. Horsey sends several photographs, some of large size; but they are a little too black and cold, and in many instances the subject is too low in the plate, which dwarfs the hills. The Judges are of opinion Mr. Horsey can do better work, and hope he will profit by these remarks. Mr. T. M. Brownrigg has a goodly number of examples, soft and delicate, of Italian and English scenery. Mr. C. V. Shadbolt sends some careful work. Mr. A. G. Tagliaferro contributes some very good instantaneous examples. Mr. W. R. Ridgway's frame of views in North Wales is fairly good. Mr. C. A. Fernley, of Reigate, is not so well represented as in former years. Mr. G. Brightman again sends some of his careful work, and has been awarded a first bronze medal for frame 872. Mr. P. H. Emerson sends a fairly good selection of views. The Rev. A. Malan has a second bronze medal for some very good instantaneous pictures of express trains. This class of picture does not, however, give the idea of motion.

PHOTOGRAPHIC APPLIANCES.

Mr. G. Hare, London, carries off the first silver medal for his New Patent Camera, which appears perfect in every way. It has great range of focus and every conceivable action, and is fitted with swing back and swing front, leaving nothing to be desired. Mr. W. G. Tweedy exhibits an instantaneous shutter, similar to Mr. S. P. Jackson's, only with four openings instead of two, passing one another. Messrs. T. F. Shew and Co., of London, also send a shutter similar to that of Mr. Jackson, with a screw to regulate the exposure. Their camera and other exhibits are of ordinary make, possessing no special feature. Messrs. W. H. Oakley and Co., London, are rather strongly represented in lantern appliances. Their portable lantern screen is a capital arrangement, and the Judges recommend it to the special attention of lanternists. They also send a portable and ingenious reading lamp, which seems very perfect, and a specimen of their interchangeable or blow-through jet, extremely well made. The notable feature is that it is fitted with a double regulating cock, whereby, when the gases are once adjusted, they can be shut off, and turned on instantly without any readjustment, which is a very novel feature. A second bronze medal has been awarded to this invention. Mr. Cheney has several exhibits, including a changing bag for dry plates, tripod stand, and lantern-screen elevator. This last does not seem very substantial, and appears far too complicated to come into general use.

NATURAL HISTORY.

JUDGES:—*Rev. W. Rogers, Chairman; Messrs. E. Bullmore, G. H. Fox, Howard Fox, A. L. Fox.*

The exhibition of objects in this section is neither large nor of special merit. There are three competitors in stuffed fish, (Messrs. W. H. Dunn, W. Barber, W. J. Hodges,) to each of whom money prizes are given. In a case of fishing rods, tackle, &c., we find a great need in ordinary reels supplied, by an arrangement for taking them into two parts. The prices of the articles seem very moderate, and we suggest a first bronze medal being given to the exhibiter, Mr. D. Sclater. There are two collections of wild flowers. To one (Miss Florence Pease) a prize of £1 is recommended. The specimens are numerous, and those which are poisonous are distinguished from the rest; some, however, are not British, a few are wrongly named, many are in duplicate, and a proper system of arrangement and classification has not been observed. The other collection (R. M. James), to which we recommend a prize of 5s., is small. Several specimens here also are incorrectly named; the localities have been omitted, and the arrangement is defective. A book containing the sphagna of West Cornwall (Mr. W. Curnow) is a valuable collection of specimens of a not very well known branch of botany. The committee recommend a first bronze medal. A "calendar of nature" (Mr. G. Wells) corresponds fairly to the requirements of the society. If the observations are original it deserves a prize of £1. A revolving observatory hive, stocked with Ligurian bees (Rev. A. H. Malan) is cleverly designed and well made. It shews the bees and combs to advantage, and we recommend a second bronze medal. A model bar frame hive (Mr. H. K. Moxey) is very complete, but embodies little that has not already been submitted at exhibitions of this Society. This is highly recommended. For a concentric trappean nodule Mr. Howard Fox receives a second bronze medal.

SHORTHAND.

JUDGES:—*Mr. R. N. Worth, F.G.S., Chairman;*
Mr. J. S. Dunn.

The Judges of shorthand have the pleasure of reporting not only an increase in the number of competitors, but an improvement in the quality of the work. This year a speed of 100 words a minute has been closely approached, and nearly all proved equal to 80. There is an improvement, also, in the transcription, and some of the competitors really left nothing on that head to be desired. As a rule the characters were very clearly written, although the occupations of some of the competitors were very adverse to this. Mary Uren Francis, who entered last year, competed also this, and shewed steady progress. Not one of the competitors is from Falmouth. The awards recommended are—John Olver, Truro, £1 1s.; J. H. N. Williams, St. Agnes, 15s.; Mary U. Francis, Pool, 10s. 6d.; M. H. Barkell, Truro, 7s. 6d.; T. H. Edwards, Tuckingmill, 6s.; H. Letcher, St. Agnes, and S. J. Hooper, St. Agnes, 5s. each.

LANDER COMPETITION.

JUDGES :—*Rev. F. R. Hole, Chairman ; Mr. F. E. Fox, B.A., F.R.G.S.*

The Judges consider that the essays partake too much of the character of mere copies of various authorities, rather than showing the result of careful reading and study. Some might with advantage have been condensed and a greater amount of clearness attained; this also may be said in respect to some of the maps. A small prize of 4s. is given to No. 940, Philip Sedgman, the work being creditable to so young a boy. F. H. White's care, industry, and illustrations are all highly commended, but having taken a 12s. prize last year, he cannot take one of the same value this, and his essay on and map of Mexico do not entitle him to one of higher value.

NEEDLEWORK.

JUDGES :—*Mrs. F. R. Hole, Mrs. C. Clift, Mrs. W. Hooper, Mrs. W. Rogers, Miss A. Francis.*

The Judges regret that the quality of the plain needlework is inferior to that of former years, and the specimens of knitting and darning are so few that no special prize has been awarded. The Judges would suggest that the shapes of the garments generally need improvement.

ART NEEDLEWORK AND LACE.

JUDGES :—*Mrs. Haslope, Mrs. E. W. Fox.*

The exhibits this year in art needlework are fewer than usual, and need no especial mention, with the exception of a square adapted from a small piece of old needlework (probably Queen Anne period), which we consider of unusual merit. We beg to thank the Misses Trevenen for some interesting specimens of old hand-worked lace. The Honiton lace is of inferior quality, with the exception of the pieces to which we have given a prize.

Exhibition Notes.

On TUESDAY evening, Mr. SYDNEY HODGES gave a very pleasant and able lecture on "Pictures in Pen and Pencil." The chair was occupied by the Rev. CANON ROGERS, ex-president, and there was a large attendance. Mr. Hodges first dealt with the art of painting, holding that while the ancient masters studied the art with a devotion to it and from a deep religious zeal, it had now degenerated into a calling, and was taken up by many simply because it was a respectable way of making money. Art at one time was a sacred profession, but it was now becoming a trade. Having referred to the works of the greatest ancient and modern artists, Mr. Hodges lucidly explained the close affinity which existed between the eye and the ear, and to illustrate his meaning proceeded to recite some striking word pictures from the writings of Ruskin, Tennyson, and George Sims. At the conclusion of the lecture a hearty vote of thanks was proposed by Mr. Howard Fox, and seconded by Mr. E. D. Anderton, both of whom referred to the services rendered to the Society by Mr. Hodges when he was its secretary; while Mr. Hodges, in reply, spoke of the pleasure it gave him to come again among old scenes and revisit old friends, and to find the Polytechnic in so thoroughly flourishing a condition.

The receipts for the day were £22 15s., £17 19s. in admissions, and £4 16s. by sale of catalogues.

On WEDNESDAY there was a very large attendance, the Miners' Association holding its annual meeting as usual at the hall, under the presidency of the Rev. Canon Rogers; and the members of the various classes mustering in large numbers.

In the evening the Hall was well filled to hear a lecture, of a most entertaining and interesting character, from Mr. A. B. HARDING, F.P.S., on "The Millionth of an Atmosphere." The chair was occupied by Mr. NAYLOR CARNE. The lecture consisted of a popular and erudite exposition of recent discoveries in radiant matter. Mr. Harding explained that his lecture was entitled "The Millionth of an Atmosphere" because the vessels with which he was experimenting were exhausted until they only contained about one millionth part of the air which they would contain if they were filled with ordinary atmosphere. In most pleasant style, he carefully explained the technicalities of his subject, which dealt chiefly with the phenomena of phosphorescence and fluorescence, and the lecture was illustrated by a large number of brilliant electrical experiments, which were much admired. Mr. Harding was assisted in his experiments by Mr. Horace Richards, of Falmouth.—On the motion of Canon Rogers and Mr. Alfred Lloyd Fox, he was heartily thanked for his lecture.

Receipts of the day £39 16s. 6d. £36 0s. 6d. in admissions, and £3 16s. in catalogues.

On THURSDAY the competitive trials of Pulverisers commenced at the Docks, and during the day papers were read at the hall by Mr. THOMAS on "Refuge Harbours and the Greenway Breakwater," and Mr. WÜNSCH, F.G.S., on "The Genesis of Slate Rock and on the Theory of Vulcanicity."

In the evening an admirable and most successful concert was given under the direction of Mr. C. W. Robinson. The hall was crowded to excess, and the long programme was carried out in a faultless manner. The concert commenced with a brilliantly executed pianoforte duet by Miss Benjamin and Miss Broad. This was followed by a most ably rendered baritone solo, "In the Cloisters," by Mr. C. W. Robinson. Mrs. A. Tuer was thoroughly successful in her solo "Land of Rest," which she sang with a remarkably powerful yet refined contralto voice. Mr. Robert Benjamin, in his several violin solos, gained great popularity with the audience, and well deserved the encores he received, for his playing was of the first order and shewed a complete mastery of his instrument. One of the most enjoyable pieces of instrumental music of the evening was the trio "Meditation," by Mr. R. Benjamin, violin; Mrs. Benjamin, pianoforte; and Mr. F. B. Rogers, organ. Miss Lily Benjamin also sang with great taste and finish in the serenata; and Lieutenant-Colonel Carlyon was most successful in his baritone solo "Thine alone," which he gave with wonted ability. In the second part both vocalists and instrumentalists alike acquitted themselves admirably, and all the artistes received hearty encores. Miss Broad's pianoforte solo was particularly fine, being executed with exceptional dexterity and correctness. Mrs. Benjamin, Miss Broad, Mr. Robinson, and Mr. Rogers, each played able accompaniments during the evening. Mr. Robinson was much congratulated on having been able to focus so much talent upon his entertainment, and on the influential patronage it received, and on the motion of the Rector of Falmouth (the Rev. B. Christopherson), he and the artistes generally were heartily thanked.

Receipts, £48 14s. 10d. Admissions, £46 5s. 6d., catalogues £2 9s. 4d.

On FRIDAY the Pulveriser trials at the Docks continued, and in the evening the prizes in the Art Union were drawn. On

Thursday and Friday the annual excursion of the Royal Institution of Cornwall came off, and several members of the Polytechnic Society and their friends availed themselves of the opportunity of joining.

Receipts £18 8s. 6d., of which 18s. were for catalogues.

On SATURDAY the exhibition was brought to a close, when an excellent concert was given in the evening under the direction of Mr. T. J. Thuell.

The receipts of the day were £20 7s., £1 3s. 6d. for catalogues—bringing up the total for the week, with £6 7s. 6d. in season tickets, to £150 9s. 4d., fifty per cent. more than had been taken at any previous exhibition, the Jubilee only excepted.

ON THE GENESIS OF SLATE ROCKS, AND ON THE THEORY OF VULCANICITY.

BY E. A. WÜNSCH, F.G.S.

No one visiting Falmouth for the first time can fail to be struck with the beauty of its rocky shore. The clay schists, or killas, as locally termed, tilted up at high angles, are scooped out into a variety of small bays, coves, and detached rocks, facing the sea at every angle relatively to the shore, and affording shelter from every wind except the balmy south. The rocks, at first sight, or in dull weather, of a somewhat monotonous tint, soon reveal in the bright morning sun various delicate shades of grey, drab, buff, pink and red, upon a back ground of dark grey and black, the whole relieved by the glistening white of the interspersed layers and veins of quartz. The capriciously stratified and contorted layers of the rocks, their varied mineral composition, and their great extent inland, rising in gently rounded hills until they abut upon the granite, suggest a most interesting subject for further investigation, and have in my mind naturally given rise to the enquiries:

What is the nature of these rocks?

Whence are their materials derived? and

How do they come to be in their present position?

Upon these questions I have been pondering often and long during a stay of some length at Falmouth, and the answers which I have endeavoured to find for myself, I shall now briefly attempt to lay before you.

I.

What is the nature of these rocks?

Mineralogically, the great bulk of them is made up of clay and sand. The original constituent of clay is aluminium, rarely met with in a pure state. In its oxydised state it is known as alumina, and is even then comparatively rare, but when combined with the exceedingly common mineral silica or flint, it forms silicate of alumina, and with the addition of water to the extent of 15 to 20 per cent. gives us our common clay, or, chemically speaking, hydrous silicate of alumina. The addition of about 15 per cent. of soda or potash transmutes silicate of alumina into that well known mineral felspar, forming so large a constituent of granite and other crystalline rocks.

The original constituent of sand is silicium, likewise rarely met with in a pure state, but the oxidised mineral silica, or common sand, is distributed almost universally.

Flint, deposited from a fluid state, is one of the purest forms of silica.

These then being the chief constituents of those great rock-masses, the question arises:

II.

Whence where these materials derived?

The only answer that can be given is that the materials of clay schists and all sedimentary rocks, detrital rocks as they are most properly called, are derived from the destruction of previously existing rocks, a destruction that we see going on every day around us, and that has been at work from the earliest geological times.

The Laurentian rocks, the oldest known series, extending to a thickness of about thirty thousand feet, are the only remaining traces of some previously existing unknown rocks, and as we ascend in the series we see this process of destruction and reconstruction repeated again and again, until we arrive at our own period and see the operation of natural forces still going on incessantly around us,—the rain, frost, and snow, dissolving and disintegrating the solid rocks, the rivers carrying down the materials to lower levels and into estuaries, to be thence spread by the action of waves and currents over the bottom of the sea.

As an instance of these operations of Nature at the present time, and at the same time typical of, or we may say identical with, countless other instances in past times, we may take the Mississippi, with its immense drainage area and its enormous daily outpour of sedimentary matter, constantly enlarging its area of deposit and gradually filling up the Gulf of Mexico.

At the point of contact with the salt water the sand and gravel, hitherto sustained by the velocity of the stream, are deposited and spread out by waves and currents over the sea-bottom, while the fine mud is carried still farther out to sea, and finally deposited in deep water. The outer deposit will thus consist of fine mud, but as the estuary increases and gains upon the sea, the carrying powers of the stream will be increased and advanced and will enable it to deposit sand and grit upon the area formerly reached by mud only. The mud will be carried farther out again, to be in its turn overtaken and overlaid by fresh layers of sand, thus giving rise to and accounting for those alternate layers of lighter and heavier materials, as we see them in the strata that have been brought to the surface.

During this long process of alternating deposits, the forces of nature, producing organic life in every conceivable form, will as ever be in full play; the sands, muds, and clays, will swarm with organisms capable of sustaining life in such surroundings; their remains will become entombed in the strata, and will mingle with the remains of fish and saurians floating in the water above, and with the remains of land plants and animals carried down by the river, to afford in after ages materials for the geologist to indulge in more or less correct theories as to the physical life and aspect of a bye-gone period.

Let us now assume that by one of those great physical convulsions of which we have had such an appalling instance in the recent earthquake in Java, say by the sinking of a large area, the flow of the Mississippi should be diverted eastward at a point some hundreds of miles above its southern outlet, consequently pouring its waters into the eastern seaboard of the Atlantic.

The waters of the Gulf of Mexico, deprived of their supply of river sediment, would then recover their natural clearness—the organisms flourishing in mud and sand only would die out, corals, encrinites, and shell-fish, thriving in clear water, would take their place, and their calcareous remains accumulating through untold ages would develop into one or more of those thick beds of limestone, which are characterised by their uniformity and great extent, such as the Carboniferous mountain limestone.

By another physical revolution, such as we have a right to appeal to, because we know from experience that they form part of the earth's history, another extensive sinking of the ground, accompanied probably by violent volcanic ejections, might take place in a direction south of the Gulf of Mexico, and the waters of a mighty river like the Orinoco might be diverted in a northerly direction, entering the Gulf of Mexico at about opposite to the estuary of the Mississippi. We should then have the story of the birth of the Mississippi deposits repeated by the Orinoco, with the remains of a somewhat different fauna and flora, since both geographically, as well as in point of time and organic evolution, a perceptible difference might be looked for. The great intermediate deposit of limestone would serve as a boundary wall between these older and newer deposits, about the names of which future geologists might wrangle, but which we are clearly entitled to call respectively the Mississippi and

Orinoco beds. The only point left for further elucidation is the intermingling with these sedimentary masses of volcanic products, and of metamorphic and granitic rocks, and these points naturally fall to be adverted to when we come to consider our third and last question:

III.

How do these rocks come to be in their present position?

Nature is never at rest. So far from these deposits, as thus far described, lying at the bottom of the sea as dead and inert masses, there is a constant circulation and interchange of particles, a constant renovating and recreating process going on amongst them. The enormous pressure of overlying and ever-increasing masses of rock and water must produce a shrinking and compression in these lightly deposited and loosely aggregated strata, sufficient to account for a first instalment of those joints, flexures, and transpositions, which the geologist is called upon to explain on the re-appearance of the strata in the shape of dry land. The numerous cracks, fissures, and inequalities of every kind thus produced in strata only partially consolidated will give rise to a circulation of water charged with mineral solutions of various kinds, derived from one kind of rocks which, thus deprived of some of their solid particles, will become porous and brittle and liable to collapse under the pressure of superincumbent and more solid rocks. The same solutions will permeate other rocks and redeposit in their interstices the dissolved mineral matter in the shape of crystals.

One of the most powerful causes of expansion in rocks is the formation of crystals, more especially crystals of felspar. The addition of about 15 per cent. of soda or potash, as we have already seen, transmutes into felspar the silicate of alumina of which clay schists are mainly composed. The expansion in bulk of masses thus crystallised, is equal and may be superior to the expansion of water when crystallised into ice, an expansion sufficient within the short diameter of a jug or a waterpipe to burst the rigid walls of earthenware or metal. What then must be the expansive crystallization of strata thousands of feet in thickness and hundreds of miles in lateral extent, if we take into consideration that this process may go on for untold ages, and may be repeated again and again as fresh strata are brought within its range. We have in it a cause hitherto not sufficiently acknowledged, of the gradual rise of marine strata into dry land and even mountain ranges. But that this can be anything more than a partial cause will be maintained by no philosophical geologist. There are other and more universal causes at work, such as the gradual shrinking of the whole globe, in consequence of which the outer crust of rocks, gradually subsiding, has to accommodate itself to a reduced area. The effects of lateral pressure thus come into play, commencing in gentle undulations at one end of an extensive area, gradually rising into more pronounced folds, and culminating in the most violent contortions and inversions of strata, as evidenced in the structure of mountain chains.

The surface of land appearing above water is immediately attacked by the ever-active forces of denudation—wind, rain, frost and rivers—commencing anew the work of destruction, and thus the rock materials complete their circular tour, and we arrive once more at the point from which we started. If my theory and descriptions are true to nature we should, on the uprising of sedimentary deposits such as I have attempted to describe, and allowing for the effects of denudation, find a country very much as we see it now around us.

It has been said that, standing by the side of a river, if we could but abolish time, we could witness a whole continent flowing past us on its way to the sea. The fertilizing mud of the Nile is due to the disintegration of the clay schists and other felspathic rocks of the highlands of Central Africa, and a philosophic spectator on the banks of the Nile, abolishing time, could thus see the mountains of Equatorial Africa flowing past him in silent procession into the Delta of Egypt, and thence into the Mediterranean.

IV.

The theory of Vulcanicity attempts to account for, and to assign their true place in nature to, the elevatory forces already referred to.

In no branch of their science have geologists of the earlier school given rein to wilder speculations or more unfounded theories, than in connection with earthquakes and volcanic action. The fluid molten state of the globe, the vast lakes of subterranean fires ever ready to burst forth, find no place in the vocabulary of the modern geologist. The opinions of physicists have been quoted to give colour to various theories, but the most eminent physicist of modern times, Sir William Thomson, has laid down the axiom—which I have taken down in my note book from his own lips, that "*of the state of the interior of the earth we know absolutely nothing*." The very term "interior of the earth," as used in geological disquisitions, is misleading, for in connection with earthquakes and volcanic ejections we can only mean thereby the changes and convulsions taking place in the lower strata of the earth's crust.

So far as these movements can be explained on natural grounds, they are simply reducible to the natural law of the interchange of forces, and resolve themselves into the axiom that "*arrested motion is transformed into heat.*"

Earthquakes then are an effect and not a cause.

The cause is the motion produced in the lower strata by superincumbent pressure, by the displacement and re-arrangement of mineral particles through crystallization, and chiefly by that general shrinking back of all the strata upon the more solid kernel of the earth, with a general tendency towards subsidence, as evidenced by the deepest ocean beds, but also with the partial effect of raising submarine strata into dry land and mountain ranges.

To these causes I have already adverted in detail in the third part of this paper, in connection with the question of the general raising of sedimentary strata, and if what I have advanced be true to nature, the most bewildering and terrific phenomena of earthquakes and volcanic action should now be as easily explicable on natural principles as any other well understood phenomenon.

If we take the most trustworthy accounts of the recent earthquakes in Java, or of any other similar convulsions on a large scale, we find that the first symptom always is a low rumbling noise underground, followed by the actual impinging of the shock, transmitted by a wave-like motion of the earth, often accompanied by the subsidence or elevation of special areas, and ending with the bursting forth of showers of ashes and flows of liquid lava from orifices of pre-existing volcanic vents, or from newly formed fissures in the earth's crust.

The first impulse then in this series of phenomena must have been given by the fracture and crushing in of some portions of the earth's strata, the shock of which would naturally be propagated to the adjoining rocks, and even to the waters of the sea, as evidenced by the liquid earthquake waves extending across whole oceans. The friction of ponderous masses of rock brought into violent contact with each other, both horizontally and vertically, acting as weights and levers on an enormous scale, will be sufficient to grind into dust and ashes, or reduce to a liquid molten state, extensive areas of rock, and these products of volcanic activity will find vent at the weakest points, through linear fissures, or through isolated volcanic orifices.

However appalling to our poor humanity these results, the only natural explanation as to their cause can be, that we witness simply the effects of motion transformed into heat—

and although so disastrous and widespread in rare instances, volcanic convulsions as a rule are fortunately very intermittent, and confined to comparatively small areas.

I had no intention when preparing my paper on sedimentary rocks to link on to it a dissertation on the origin of earthquakes, but the charm of geological investigation is that all its subjects are found to be closely connected with each other, like links in an endless chain, and while discussing the process of the gradual rise of submarine strata into dry land and mountain chains, it seemed but natural to advert somewhat more in detail to those more spasmodic and violent processes which form one of the stages in the mutations of the earth's crust.

While reverting then, for the purpose of leave-taking, to our own clay schists, I regret that I am compelled to forego all further detailed reference to the rock formations around us, their order of succession in point of time, their mineral and fossil contents, their volcanic interstratifications, the probable cause of the metamorphism of portions of them, from sedimentary rocks into gneiss, serpentine, and granite; all these points have been touched upon by masters in the science, past and present, and will continue to afford ample subjects for investigation for years to come.

REFUGE HARBOURS AND THE GREENWAY BREAKWATER.

E. C. G. Thomas.

The subject with which we have to deal to-day is interesting to all mankind. We must do what we can to defend ourselves against the forces of nature, and we may take a great many of them into our alliance. The view I wish to put before you is the endeavour to combine the two. Man is a very puny creature when endeavouring to oppose the forces of nature, but by carefully and humbly observing them, and by taking his knowledge from the lessons of the Great Creator, he may often learn how to use these mighty forces for his own benefit. The question of harbours of refuge is a very painful one and a very difficult one to deal with. It is, as at present taken up, so very expensive that, although the need is apparent to everyone, the remedy is not adopted, the reason being that the constructions at present thought to be requisite must be constructed in deep water in stone or concrete, which all know are most expensive; in fact, the expense is so great that there are hardly any harbours of refuge at all. Looking in the Blue-books as to the cost of the breakwaters of Dover, Holyhead, Plymouth, and other places, it appears that one of these shelters could not be built in stone or concrete for less per mile than one million pounds sterling, and could not, under ordinary circumstances, be fit for use under twenty years. When we hear some heart-rending description of the wreck of a whole fishing fleet, which had arrived opposite its very port and was wrecked there—the men drowned in sight of their wives and children—and when we are driven wild with the thoughts of despair, then it is, I hope, we are all stirred up and feel it necessary to look in every possible direction to see whether some remedy could not be discovered.

The first thing one arrives at—is the conclusion that in dealing with the sea, we have perhaps so far taken a wrong direction. What has to be dealt with, in dealing with the sea, is not five fathoms' depth of water, but the surface—the depth only of the waves—for it is now ascertained that the waves do not descend from the top to the bottom, and that the lower portion of the water is not disturbed, so that in depths where ships desire to anchor the moving water is not more than 20 feet in depth. If that is the case, then in respect of a sea-wall 60 feet high, the lower 40 feet is practically of no effect, and a waste of money, as it is only there to support the upper and important 20 feet. The question then comes, can we in any way dispense with that waste? This brought me to the idea of floating breakwaters. That idea is not a new one, for various schemes have been proposed; most of them being schemes of a kind of screen to divide the waves into small portions and thus fritter away their power; and another ingenious plan is that of a floating beach up which the sea is made to run and then flow over.

The idea of the Greenway Breakwater is neither to oppose the force of the sea by massive expensive works, nor to fritter away power through screens; but, on the contrary, to direct and use that power against itself, and allow ships and harbour works to lie uninjured among waves that have spent their force upon each other, and are thenceforth devoid of momentum, or capability to injure anything. It is based on the principle that it is easier, simpler, and more economical, wiser in every respect, to take the forces of nature into alliance and use them, than at great cost to oppose them and lose their services; and this principle is kept in view in all the details of construction. This idea is applied in the following way :—In front of the locality where it is desired to have calm water, and protection from the heavy blow of an Atlantic wave, or the tearing effect of a violent current, the inrushing waters find in their path a row of pontoons of triangular shape, presenting an apex or pointed end towards them. These pontoons are so formed and so placed that the wave is cleft by the pointed end of each pontoon (as by the sharp prow of a ship, and each cleft portion has to travel on between the curved sides of two pontoons, the curves being segments, or nearly so, of one and the same circle turned in opposite directions and so towards each other. Each portion of a wave thus easily cleft glides along the surface of one of these curved walls, and takes its future course in the direction this imposes upon it. One portion passes on in a curve to the south, and is carried by its momentum still swiftly in the same direction, say 20 feet beyond the curve that has guided it ; and another similar portion is impelled in a curve northwards from the nearest side of the next portion. Each portion is thus diverted from its original direct course towards the threatened object. Midway between the two pontoons the two portions meet, and in the concussion of their equal forces they spend their momentum. A few yards from this spot the waters will flow on as they may be impelled by tide or current, or other law of Nature, but with spent force, with but little momentum or breaking—almost as " dead water."

Although the above will suffice in most cases, it may also occasionally be found well, where waves or currents are very violent, to employ diamond-shaped buoys, or buoys with segments from a larger circle, as offering still less resistance to the waves ; and where this violence is excessive, two rows of the Greenway buoys may be used ; the buoys in the two rows so placed that those in the second or rear rank face the spaces between the buoys in the front row ; thus no portion of the wave or current could possibly pass this double breakwater without being much diverted and opposed by the counter currents created by the two sets of buoys. The size of each buoy and the distance they are anchored apart will depend on the requirements of each case.

If it is desirable that large vessels should pass through any part of the breakwater, the buoys on either side of that portion should be larger and further apart. The force of the current and the curve adopted will determine the question of the distance apart at which they should be moored—namely, not too far from the counter currents to oppose and rob each other of momentum. In cases in which vessels can enter a masonry harbour, or seek the shelter of the leeside of the breakwater itself, by rounding the end of it instead of running through it, the buoys may be smaller and nearer together.

The Greenway Breakwater may be employed in the protection of existing masonry harbour works, lighthouses, wrecks, exposed beaches, eroded by the action of the waves or currents, or for the creation of shelter in places where no works at present exist. It may be constructed of anything; masonry, stone, wood, or iron, or even any other lighter substance, the peculiarity consisting in the form and position of the parts—the principle being simply that portions of waves or currents are turned out of their direct course and against each other, so as to expend their momentum in this collision, this internecine struggle, before they can reach the port or shipping which it is desired to protect.

The mode of construction adopted by me is as follows:—Since a wave moves faster at the surface than below, and the chief momentum is therefore above, and as few waves whether of oscillation or of translation, or of percussion, materially affect the movement of water for more than twenty feet in depth, it is at the surface, and not at the bottom, that we need any works to affect them. When the action of currents has to be met, the same remark will apply in cases in which it is a surface current. Thus in most instances a surface—*i.e.*, a floating—breakwater is what is needed. In the case of under-currents alone will the deflecting side need to start from the bottom rather than the surface of the sea. If the deflecting vertical side is carried down for ten feet this will very powerfully affect the water in contact beneath for at least another five feet, and in diminishing degrees for ten feet, thus more or less deflecting water to a depth of twenty feet. For ordinary circumstances, therefore, it will suffice if the deflecting walls of the pontoons are ten feet deep. Where necessary it will be as easy to make them twenty. The pontoon should be of triangular form, each side twenty feet long, and ten feet deep. Each side should present a concave curve to the sea. In order to render the whole buoyant, one great air chamber, of the exact shape of the pontoon, may fill up the interior.

In some positions these pontoons may be allowed to swing to a single anchor, in which case they will adjust themselves automatically to any change of tide or current, always presenting to the flowing water the line of least resistance—*i.e.*, the point, precisely as a weather-cock does to the wind. In other cases it may be necessary to keep them in a fixed position by two, or even three, anchors or moorings.

Some of the peculiar advantages of the Greenway Breakwater may be summarized thus :—1.—Comparative indestructibility. Meeting waves not with one long unbroken front, but in detached portions, and not resisting, but cleaving and evading the force of the waters, it is less likely to be injured by violent storms. 2.—Economy in manufacture.—Being constructed of few and simple parts, affecting only the upper part and not the whole depth of the water, and covering but a small portion of the area it affects, it will cost less in manufacture than any other breakwater known. 3.—Economy in construction.—As it can be put together in a short time and anywhere, and no work beyond that of moorings need be executed on the spot where it is required, there will be no necessity for the employment *in situ* of an engineer or other expensive skilled labour of any sort. 4.—Economy in conveyance, portability.—The parts when taken to pieces lying flat upon one another will occupy small space, weigh little, and can be easily and inexpensively conveyed by land or sea. 5.—Availability in exposed positions, where the continued violence of the sea greatly impedes, and, in fact, almost renders impossible, the construction of any other form of harbour work, but where a few hours would suffice for the putting down of the Greenway Breakwater, which is taken ready made to the spot. 6.—It can be kept in store in any quantity at any of our naval arsenals for any length of time, and will thus be in readiness for emergencies. 7.—Availability in any depth, thus rendering easy the construction of shelter harbours in deep water, with access during all tides, an advantage not attainable by solid masonry works except at a prohibitory cost. 8.—Construction of larger proportions that could be thought of under no other circumstances—*e.g.*, to shelter 500 vessels at a time in the "Downs." A line of Greenway buoys run out from the coast to the Goodwin Sands, 2½ miles west of Deal, and another similar line 2½ miles east, would form a harbour of refuge five miles long, and enclose an area of at least twenty square miles almost in mid-channel, and without impeding navigation. 9.—Available in portions to meet the smallest requirements, and at small cost. 10.—Permitting of vessels passing right through it, and thus driving before a storm straight into shelter without the perilous necessity of tacking and turning. 11.—Speed of construction.—A Breakwater of any dimensions could readily be manufactured, conveyed out in parts, and placed in position in any quarter of the globe, and a harbour thus formed in a few weeks or months, that would, under other methods of construction, have occupied as many years. 12.—Protection of valuable land against the encroaching action of the sea.—It might be used in one long line of defence for many miles on endangered coasts—the east coast of England and elsewhere. 13.—It will not cause the accumulation of silt, and thus ruin the port it is intended to benefit, as has been the case with many expensive constructions. 14.—In time of war, shelter might thus be created for our fleets on any part of an enemy's coast that we wished to blockade, and no stress of weather could then drive them temporarily from their posts. 15.—It would permit of the sudden disembarkation of troops on almost any coast, creating smooth water for the occasion, and being then removable.

A practical discussion followed the reading of the paper.

Mr. H. H. Cox asked how Mr. Thomas proposed keeping the buoys in line one with the other; what provision there was for preventing collision; and what depth he proposed to have them.

Mr. Thomas said they might be placed in about seven fathoms of water, which he believed the most convenient for vessels. The question of position was a very difficult one where there were contrary tides. In order to prevent collision the cables would be so measured as to keep the buoys apart a sufficient distance; when moved by the tide, they would all be moved together. He proposed introducing a pully or sheaf through which each of the wire rope cables should pass, and the three ropes being attached to a weight suspended under the buoy, this should act as a perfect spring, taking in and giving out cable as the tide rendered necessary.

Mr. J. B. Tilly asked how many weeks the wire rope would last with such a sheaf.

Mr. Thomas proposed that the rope should be coated; and as to where it ran through the sheaf, he would ascertain what would be the best coating. The sheaf should not be anything hard to chafe the cable, but should receive the rope in a soft body, and should run with it, transferring the friction from the rope and the sheaf to the axle of the sheaf. The buoys would be ten feet long, and twelve feet across the back, and ten feet deep in the perpendicular part, which would really affect fifteen feet of water.

Mr. JOHN STEPHENS (Ashfield) pointed out that the inflexibility of wire rope would be the greatest obstacle against its being used as Mr. Thomas had suggested. He would propose a combination of chain and cable.

Mr. THOMAS said he was not tied to wire rope, and his intention was to make everything as lasting as possible.

Lieut. SWAIN asked what provision there was in case the wind shifted, for altering the position of the face of the buoys.

Mr. THOMAS said that the buoy would be allowed a good deal of play, and would act with regard to the direction of the sea as a weather-cock did with regard to the wind.

Mr. MACKENZIE thought some such contrivance was required at the entrance of breakwaters now constructed, for Plymouth was as dangerous as any place in the world for small craft. He recommended good heavy cables for moorings, and asked what was done in the case of the turn of the tide getting into the back of the buoys.

Mr. THOMAS said that where this was likely to occur he had a special form of buoy prepared, which would be moored fore and aft. He considered the floating breakwaters he was speaking of might be constructed on the various fishing stations, so that the fishing boats might take shelter behind them in case of sudden storm.

Mr. ROBERT FOX asked whether the breakwaters had been practically tried, and to what extent ?

Mr. THOMAS had not been able to try a "full-sized" experiment, as that would be rather expensive for a private individual, without any object of gain. But he had tried the experiment to some extent, and found the result was what one would anticipate. He thought the theory commended itself for its simplicity, and did not suppose anyone would think it was wrong.

Lieutenant **Reed**, R.N., pointed out that the buoys would require very heavy moorings to prevent the sea raising them on the tops of the waves, and thus allowing the force of the water to pass under them.

Mr. **Thomas** replied, that the fact that the buoy was only eight feet in diameter or length from stem to stern, and that it floated ten feet deep throughout, would prevent the possibility of a wave passing even partially under it, and unaffected by it, through the circumstance of one end of it being out of water while the other end was immersed. This might happen in the case of a vessel several hundred feet in length, because this was more than the usual width or thickness of a wave, and even with the largest waves different parts of the vessel would be differently immersed, and its bows or stern might at times be entirely out of water overhanging the trough of a wave, while the other portion is passing through the crest of the wave. This could not, in the nature of things, be the case with a short deeply immersed body that rose and fell with the crest and trough of each wave. It accompanied the rising and falling water, and in either position equally cleaved and diverted it.

Mr. W. J. C. **Moens** said there might be a certain floating power in the buoys, but would that be sufficient to prevent their being sunk by the heavy moorings?

Mr. **Thomas** had calculated that.

Mr. **Mackenzie** held that the buoys must be moored very firmly to the bottom, or otherwise they would be lifted up, and the sea would pass under them.

Mr. **Thomas** admitted that they must be, but did not think the rising and falling with the waves would militate against their being affected by the buoys.

The Rev. J. S. **Flynn** thought there should be a double line of buoys, the hinder buoys being placed so that they came between the buoys of the front line ; for he could not think a single line of buoys would have the effect the lecturer supposed they would have.

Mr. **Thomas** replied that Mr. Flynn's suggestion had also occurred to him, and he considered it might very usefully and practically be applied in peculiarly stormy places.

Mr. H. **Tilly** asked what the price of the buoys would be ?

Mr. **Thomas** said fifty miles of them could be put down for the cost of one mile of stone or concrete breakwater. A small breakwater of these buoys, such as would form a yacht harbour or protect a fishing village, could be put down for £5,000.

Mr. H. Cox suggested the storing of these buoys with oil, which might be discharged from them in stormy weather.

Mr. **Thomas** thought that could easily be done.

Exhibition Details.

PATENT OSCILLATING CYLINDER STAMPER.

W. Husband, C.E., Hayle.

First Silver Medal.

This Oscillating Cylinder Stamper is a remarkable invention, embodying an entirely new principle of mechanical construction, and likely to lead to great results. The one exhibited was intended for stamping gold, but one on the same principle was at work on tin at Tregembo. In the original form of pneumatic stamp the lifter passed through the cylinder, and considerable difficulty was found with the leather and other soft packings, which required a constant water-flow over the cylinder to keep it cool. The result in effect was, that lubrication had to be effected by water, the oil washing off easily. The lubricating material, moreover, was liable to find its way down into the coffer, which, in gold stamping, was attended with the liability of "sickening" the mercury. The mechanical novelty of the new form consists in making the cylinder a part of the connecting-rod, and in making the bonnet a second cylinder. The piston-rod forms a part of the connecting-rod, and also serves for a piston. The guides are of a very substantial character ; they can be easily adjusted, and they are faced with steel, which may be easily removed and renewed. The only packing now used is metallic steel rings, no cooling is required, and oil is used for lubrication. One stuffing-box only is needed, as the lifter does not pass through the cylinder. Another advantage gained is, that the apparatus is lessened 3 to 4 ft. in height.

CAPT. CHEGWIN, of Tregembo, after a four months' trial of the Oscillating Cylinder Stamps reported:—

"We have been working two heads about four months, of which time we have worked three months both night and day (except Sundays.) During that time, except for heads and grates, the stamps have not cost sixpence for repairs or renewals, nor have we had the slightest hindrance,—and we are working to day as well as ever. We stamp about 30 tons of tin stone every 24 hours, with a consumption of about 23 cwt. of coals, the stamps making each head about 115 blows per minute. Tin stone about the average hardness of the county. The stamps are self-feeding, and they feed stuff from an ordinary pass with great regularity—requiring nothing beyond the attendance of a boy, who also attends to the strips, &c. The Tin Dresser reports, and I can confirm the statement, that the slimes are poor and small in quantity. The crop-tin is almost all unbroken crystals, and showing a produce of 13¾. This is of great importance, as the cost of dressing is thereby reduced to a minimum. In conclusion, I beg to say that the performance of your stamps has given us great satisfaction in every way. I may add that, with an increase of speed, the stamps will do more work,—125 blows per minute will stamp 40 tons in 24 hours,—but the present speed is the most suitable for our engine."

MICHELL AND TREGONNING'S PULVERISER.

F. W. MICHELL, C.E., REDRUTH.

First Silver Medal.

The Pulveriser sent for trial by Messrs. Michell & Tregonning was on their well-known plan, which has already taken the highest award of the Society—one that had been in use at Wheal Peevor. Samples of tinstuff from Wheal Agar before and after treatment in this pulveriser have been sized by Mr. Darlington, with the following results :—

BEFORE PULVERISATION.

x-6000 holes per inch	22·3	
6000-12,000 „	14·8=	37·1
12,000-0 „		62·9
		100·0

AFTER PULVERISATION.

All passed through 0-12,000 holes per square inch,

or 0-12,000	100
x-12,000	37·1
Reduced from 12,000 to 0	62·9

That is to say, the work done by the pulveriser was reduction in the ratio of 63 per cent.

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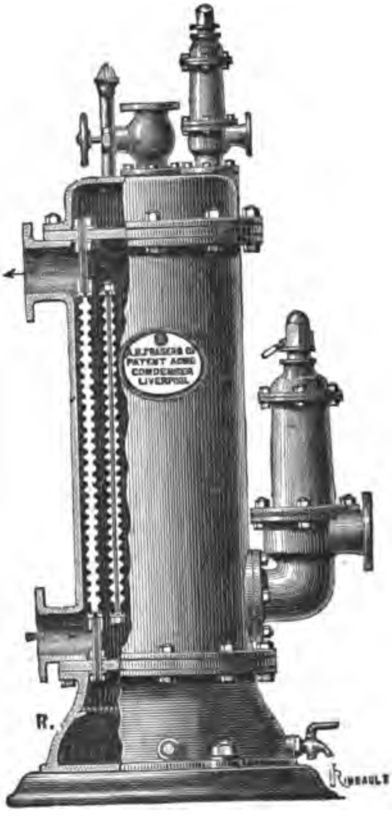
A.U.FRASER'S Co
PATENT ACME
CONDENSER
LIVERPOOL
R.
RIMBAULT

PATENT "ACME" FRESH WATER CONDENSER.

FRASER & Co., LIVERPOOL.

First Silver Medal.

The great drawback in Worm Condensers has been the inability to tin the copper worms; whilst in the case of ordinary plain chambered condensers they have to be soldered to the top and bottom plates, thus preventing them from being opened up for cleaning purposes unless by an expert and at very great cost; the chambers have also to be of considerable thickness to stand the steam pressure. In addition, there is a continuous chemical action between the solder and the tubes, which, in time, eats through the metal and causes a brackishness in the condensed water.

In the Patent "Acme" Condenser these drawbacks are overcome by the use of corrugated annular chambers, thoroughly coated with block tin. Though the chambers are made thinner, great increased strength is obtained by the corrugations, with a large additional cooling surface. In place of soldering the cylinders to the tube plate, Messrs. Fraser turn recesses in these plates. The corrugated chambers have the edges turned over a copper wire, and these are jointed to the ring by through gun-metal bolts and nuts, the packing being of braided paraffin wick, well saturated in boiled oil of the consistency of ordinary glue. After considerable experience it is found that this makes a splendid and perfect joint, the expansion and contraction of the metal being all taken up with the corrugations, leaving the joint at all times perfect, until opened up for cleaning. No soft solder therefore is used.

In Condensers with plain smooth chambers, the steam on one side and water on the other, rush through without getting the fullest benefit of condensation. The corrugated chambers, on the other hand, baffle the water or cooling medium, while they serve to break up the volume of steam on the other side and cause a more rapid condensation. As the condensed water discharges at the bottom of the apparatus where the cold circulating water enters, it comes out of the filter cold and ready for immediate use, which is of the highest importance on board troop, passenger, and cattle vessels, and more especially on board fishing craft, where they have no provision for storing or cooling the water.

The Condenser is sanctioned and approved by the Board of Trade, and is fitted with both steam and water safety valves, also approved by the Board. The complete machine is lighter and takes up less room than any other type.

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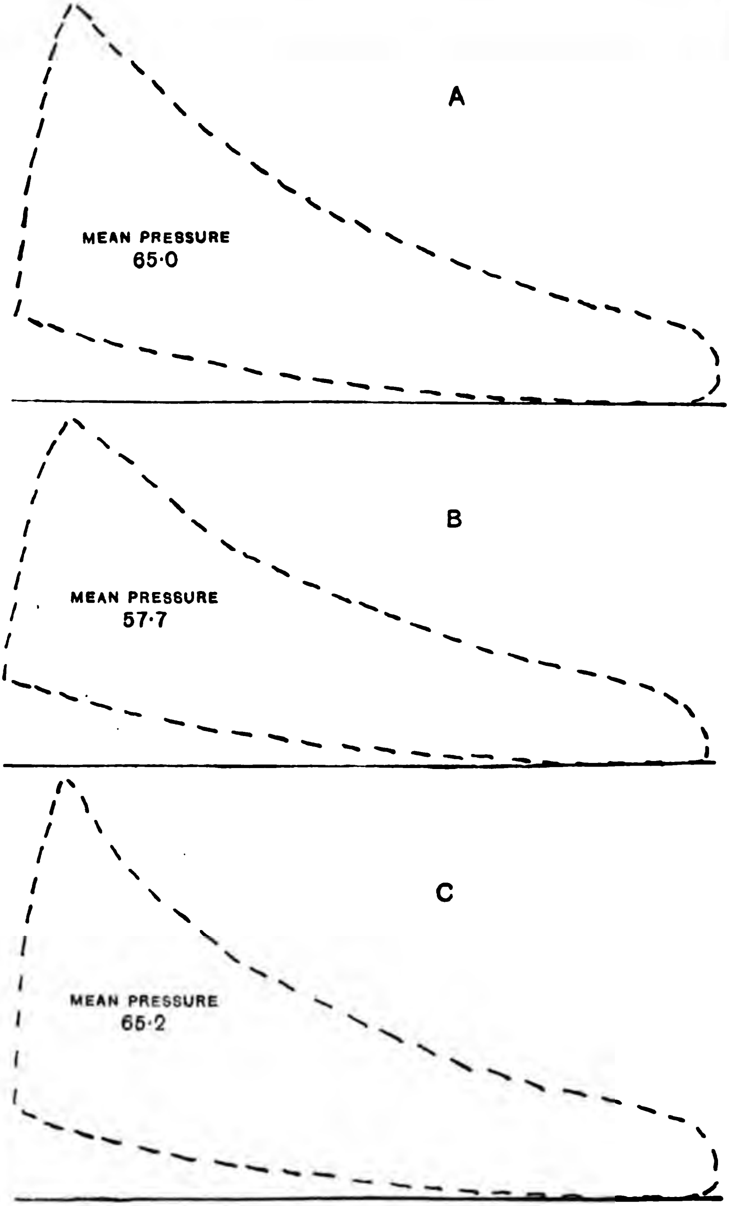

A
MEAN PRESSURE
65·0
B
MEAN PRESSURE
57·7
C
MEAN PRESSURE
65·2

"OTTO" GAS ENGINE.

CROSSLEY BROTHERS, MANCHESTER.

First Silver Medal.

A practical test of the 2-horse power "Otto" Gas Engine exhibited, was made on behalf of the Society, under the direction of Messrs. F. M. Harris, J. B. Tilly, and William Sisson, M.I.M.E., the latter gentleman acting also as reporter. The report follows, and is accompanied by diagrams of one card from each of the three last sets taken.

Only one engine was presented for trial, namely, a 2-horse power "Otto" Engine made by Crossley's, of Manchester, and it was considered sufficient to make a careful trial to ascertain the relation between the indicated horse-power developed and the quantity of gas consumed.

A trial was made on Monday, the 17th September, using an indicator and reducing gear sent by the maker's agent, and measuring the gas by means of a meter lent by the Falmouth Gas Company. The diagrams obtained, however, were not to be thoroughly relied on, as the indicator spring (one of 56lbs. per inch) was too light for the pressure developed at the beginning of the stroke, and the indicator was not in very good order.

Another trial was therefore made on the 19th September, using an indicator and spring belonging to Messrs. Cox & Co., which was in good order, the spring being also stronger (72lbs. per inch) and having been recently supplied by Messrs. Elliott Brothers.

With these appliances, a numerous and reliable set of diagrams was obtained, one of the jurors noting the duration of each test and the gas consumed; another counting the number of explosions that took place (each explosion of course indicating an effective stroke), and the third taking the diagrams; an attendant braking the fly wheel so as to cause the engine to develop as much power as possible. Although the trials did not last long, yet, considering that the diagrams were obtained every minute, the results obtained may be relied on as possessing considerable accuracy.

In order to facilitate the meter readings of gas consumed, it was arranged that the duration of each test should be determined by the passage of ten cubic feet of gas; with the exception of *(b)*, during which only three cubic feet were consumed. The diameter of cylinder and length of stroke were actually measured by two of the jurors, and found to be $5\frac{11}{16}''$ and 12″ respectively, the area of the cylinder thus being 25·4 square inches.

The gas was estimated to be of 15 candle power, and to be supplied at a pressure of $\frac{8}{10}$ of an inch of water.

The appended tables give the observations and results deduced therefrom.

OBSERVATIONS.

Letter of Test.	Duration of Test.	No. of cards obtained	No. of Explosions.	Mean average Pressure.	Maximum average Pressure.	Minimum average Pressure.	REMARKS.
o	7m. 15s.	5	421	64·88	66·1	63·4	Gas full on
a	6m. 45s.	8	448	63·61	65·0	62·7	Gas full on
b	2m. 15s.	3	162	57·80	58·4	57·3	Gas throttled
c	6m. 45s.	8	461	62·88	65·2	61·3	Gas full on

RESULTS.

Letter of Test.	Indicated Horse Power.	Cub. ft. gas 1 H.P. per hour.	No. of explosions per min.	Cub. ft. gas per explosion.	REMARKS.
o	2·89	28·6	58	·0237	The gas consumption given is *exclusive* of that required for the igniting jet, the supply for which was taken from beyond the meter, and consequently was not directly measured; the jet may be estimated to consume from 3 to 4 cub. feet per hour.
a	3·25	27·3	66	·0223	
b	3·2	25·0	72	·0185	
c	3·3	26·9	68	·0217	

It will be noticed that in none of these tests have the explosions per minute reached the normal number corresponding to the intended speed of the engine, that is 160 revolutions and 80 explosions per minute; this of course simply arose from the fact that the braking of the fly wheel was not performed with sufficient constancy to ensure a regular speed of 160 revolutions per minute, and an explosion every two revolutions. To deduce the power corresponding to such conditions of working is simply a matter of proportion; thus taking test *a* we have the power at 80 explosions per minute, $= 3 \cdot 25 \times \frac{80}{66} = 3 \cdot 93$ H.P. Similarly test *c* would give the power $= 3 \cdot 3 \times \frac{80}{68} = 3 \cdot 88$ H.P. In reference to the larger consumption shown by test *o*, it may be remarked, that at starting the cylinder and piston had to be warmed up, and though the engine had been running previously, yet apparently not quite sufficient time had been allowed for this, and consequently this first test did not show such good result as the following ones.

The working of the engine was quite smooth and satisfactory.

DAVEY'S PATENT DIFFERENTIAL VALVE GEAR.

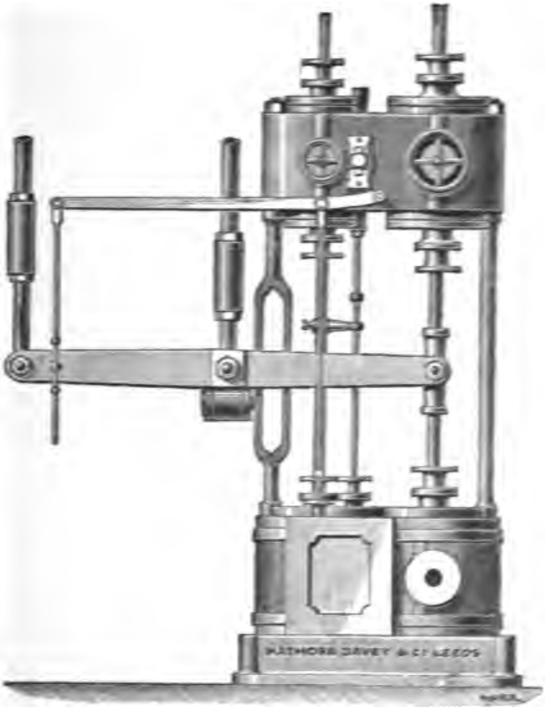
HATHORN, DAVEY & CO., LEEDS.

Second Silver Medal.

The illustration represents a perspective view of the Gear, as it has been applied in numerous cases to existing Cornish and other engines. It consists of a lever called the main lever, by means of which motion is given to the valves through a rod. The motion of the engine is given to the outer end of the lever through another rod by means of a lever of the first order, the long end of which is attached to the plug rod or any moving part of the engine, where it gets the motion of the piston on a reduced scale; the other end deriving its motion from the subsidiary cylinder, and being controlled by means of a cataract. The cylinder has a slide valve, which is worked by means of a tappit arm on the rod of the piston of a secondary cylinder; the motion of the secondary piston is also controlled by a secondary cataract. The slide valve is, however, free to move with the motion of the hand lever.

It will be seen that there are two hand wheels and a lever attached to the cataracts. The function of the large wheel is to regulate the speed of the engine during the stroke, the small wheel is for regulating the pause between the strokes, whilst the hand lever enables the engine-man to hand-work the engine. A rocking shaft is employed to give motion to the valves of the engine in the usual way, not shown in the engraving.

The action of the Gear may thus be described:—Let the engine be "out doors." The engine end of the main lever will then be in its highest, and the opposite end in its lowest position, the


HATHORN DAVEY & Co LEEDS

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secondary lever being lifted so as to admit steam to the bottom of the secondary cylinder. The engine will pause until the piston of the secondary cylinder shall have travelled to the end of its stroke, and have lifted the valve of the subsidiary cylinder. The pause will be long or short, according to the regulation of the secondary cataract. The piston of the subsidiary cylinder then having steam on its lower surface will travel upwards, actuating the main lever with a speed dependent on the adjustment of the cataract. In doing so, the steam valve of the engine will be opened through the medium of the rod, and rocking shaft, &c., and will be opened quickly, because the engine end of the lever is, for the time being, stationary. Steam now being admitted on the engine piston, it will, after overcoming the inertia of the load, move off at an increasing speed, which is communicated to the engine end of the main lever. The result is that as the opposite end of the lever is moving uniformly in the opposite direction at the same time, the motion of the centre is soon reversed in direction, and the steam valve which was opened by the motion of the subsidiary piston is closed by the differential motion, brought into action by the motion of the main piston.

GAS COOKING STOVES.

JOHN WRIGHT & CO., BIRMINGHAM.

Second Silver Medal.

Messrs. Wright & Co., of Birmingham, made a large and varied display of their cooking stoves and gas heating arrangements. Conspicuous among the former were the "Eureka" Gas Cookers. These stoves are double cased and jacketed on the sides, top, back, and door with a new and very efficient non-conducting material, by which a saving to the extent of 40 per cent. of gas is effected, in preventing loss of heat in the oven by radiation. Some idea of the value of this non-conductor may be gathered from the fact that a teacupful of water (jacketed with ⅜ths of an inch of the silica), which at ten o'clock stood at 203 degrees Fahrenheit, had at two o'clock lost only 50 degrees of its heat.

The hot plate is formed of wrought iron bars, polished upon the top, which form a perfectly flat surface to receive saucepans and kettle, while, as the bars are loose they can be instantly removed for cleaning, &c. The hot plate being of wrought-iron cannot possibly be broken (as is often the case where cast-iron is used) by water boiling over it whilst it is hot, thereby causing sudden contraction of the metal.

All the interior fittings are removable, and the pans so arranged that anything being upset or boiling over is collected by them. The shelves are so arranged that they can be placed at different heights to suit bread, pastry, meat, &c., and by a new arrangement in the top of the oven, the waste heat is made to do double duty and a better top heat is secured—a most important point for light pastry, &c.

Another form of Gas Apparatus that attracted much attention was their "Duplex," a combined boiler and heating stove, with movable copper reflector. Their "Cosey" Gas Stoves were also particularly noteworthy. They are fitted with cast-iron gratings interlaced with platinum wire, and have asbestos backs. This arrangement secures a brilliant appearance the moment after lighting.

MODEL OF IMPROVED SKIP AND SKIP-ROAD.

Capt. James Thomas, Redruth.

Second Silver Medal.

Capt. James Thomas, exhibited a model of a Skip-road in use at Pedn-an-drea, upright and underlie, with an automatic arrangement which brings the skip at the bottom in direct position for filling. This was regarded by the Judges as one of the most valuable improvements that have been made for some time in skip-roads and fittings.

THE "DEAD-BEAT" SECTIONER.

J. P. Maginnis, M.I.M.E., Westminster.

Second Silver Medal.

The difference between a drawing that has been "sectioned" or "hatched" by eye, when compared with one prepared by some mechanical means, where a ruling machine is employed, as by lithographers and engravers, is readily perceived. Many an otherwise excellent drawing is ruined in appearance by the irregular pitch or spacing of the section-lines. This being granted, the utility of the "Dead-Beat" Sectioner will be unquestioned. The inventor feeling the want of an instrument which would rule equally-spaced parallel lines with precision and rapidity, constructed, some years since, a simple apparatus which has answered the purpose, and is capable of ruling lines one two-hundred-and-sixtieth of an inch apart, with great regularity. The method of using the sectioner is as follows :—Place the longest edge of the set square against the ebony ruler, so that the taper blade of the latter lies between the two pins of the former. Loose the binding nut and withdraw the taper blade until there is a certain amount of " play" between the blade and the two pins—then tighten up the binding nut. Lay the instrument on a flat table or drawing board, and by alternately sliding the set square and ruler till progress is stopped by the blade coming in contact with the pins, first one and then the other, a sort of walking motion is produced. Lines may be ruled against either of the free edges of the set square at each stoppage or " beat " of the blade. Care must of course be taken to keep the one part of the instrument quite firmly held down to the table, so as to form a steady guide for the other part whilst it is being slipped forward. With a little practice the operator soon acquires dexterity.

The Sectioner with spiral adjustment only differs in the mode of regulating the pitch of the lines, the working of the instrument being precisely similar to that of the "Dead-Beat" Sectioner just described.

To rely upon "sectioning" by eye is both tedious and very trying to the sight, and however careful the draughtsman may be, he is sure to get some irregularities in the spacing of the lines, which attract notice at once when too late to rectify. The instruments just described, being mechanical in their action, overcome these objections, and produce satisfactory and reliable results. They may be applied with equal advantage to other work than sectioning.

PATENT AUTOMATIC SHIP VENTILATORS.

UTLEY & FAWCETT, LIVERPOOL.

Second Silver Medal.

Mr. Utley made a good display of Utley and Fawcett's Patent Automatic Ship Ventilators. They are so constructed that it is impossible for any water to find its way inboard, and are made of great strength, of $\frac{7}{16}$ inch iron for stoke, boiler, and engine-rooms, &c. It is not requisite for the outside air to blow directly on to the ventilator to cause a free delivery of fresh air. A ventilator has been specially designed for the purpose of fitting on the inside of engine-room skylight combings, so strong that it will stand any kind of weather, and so fitted with cork valves, which rise with a dash of water and exclude it, and fall when the water pressure is withdrawn, that they are perfectly tight against the waves, while they secure both perfect light and perfect ventilation. The principle is applied excellently to portholes, and there are special adaptations of the system to coal-carrying vessels, emigrant and cattle vessels, &c.

Messrs. Utley and Fawcett remark, with regard to the various details of application,—

The most heated parts of a stoke-hole are in at the sides; by fitting our Class IV. Stoke-Hole Ventilator both port and starboard, a constant current of pure air is supplied to the stoke-hole right at the sides. By being able to bring the pure air in at the sides, you get a complete current of air, supplied continually, the Ventilators being so constructed that it is impossible for any water to find its way inward. It is not requisite for the outside air to be blowing direct on to the

Ventilators to cause a free delivery of cold air through them. The heated air and its evaporation inducing the motion of the cold air, it finds its way down to the parts where the heated or foul air is. This class of ventilator does away with the ordinary Deck Ventilators, which are an obstruction to the look-out in foggy weather.

How to build an Engine-Room Skylight is a question that deserves very close consideration. Take the present system—what does it mean? A vast amount of expense for much light ornamental work that a sea is liable to carry away any minute. The result is, the water gets into the stoke-hole; in many cases the vessel founders, entailing a fearful loss of life, and tremendous destruction of valuable property. To overcome this difficulty we have designed a Ventilator for fitting on the inside of the engine-room skylight combings. In having them fitted round the combings, we have a permanent iron cover on the top, and obtain an equivalent to an open skylight, as well as a perfect light. This Ventilator being constructed of $\frac{7}{16}$ inch iron, and glass $1\frac{1}{4}$ inch thick, the combings and top being iron, the skylight will stand any sort of weather the vessel might have to pass through, and there can be little danger of its being carried away.

One of the important questions of the day is—How should a coal-carrying vessel be ventilated to avoid spontaneous combustion? We believe the only means to counteract spontaneous combustion in coal-carrying vessels is to supply an efficient surface ventilation, so as to place the coal as nearly as possible in the same condition as when in the open air. A continual current of air passing over the top of the coals, causing a very rapid removal of the gas rising therefrom, is what is necessary. By fitting our Class IV. Ventilator on the inside of the bulwarks, both port and starboard, and leading the connecting pipes through the waterway, a steady current of air into the vessel is obtained. Thus there is complete control over the gas rising from the coal, and it is forced to the centre of the hold, where it finds an exit through our Class II. Deck Ventilators or Class III. Hatch Combing Ventilators.

When Lord Hampton was First Lord of the Admiralty a Committee reported that the disease which prevailed in troopships arose from the fact of there being no plan enabling them to have the portholes continually open. This remark is true in regard to emigrant and cattle vessels, and shews the great importance in having sea-going vessels thoroughly ventilated. If fine weather at sea were continual, it would allow any or every opening in the vessel to be open, and there would be little cause for complaint; but such is not the case, and the sufferings emigrants and cattle have to undergo when the vessel has to be battened down through stress of weather are simply appalling. Our aim has been to supply to the public a Ventilator so constructed, that either portholes, saloon skylights, engine-room skylights, hatchways, ordinary deck ventilators, or any other openings, can be kept open without the least danger of water entering inboard, however bad the weather may be. In other words, we secure an equivalent for all the advantages a vessel has in fine weather. So long as the afore-mentioned openings are kept free, a thorough circulation of air throughout the vessel will be maintained, and where such a circulation of air continues it is impossible for the foul air to remain. Porthole ventilation is the most efficient ventilation it is possible to supply to emigrant and cattle vessels. By fitting our Porthole Ventilators port and starboard, however calm and warm the weather may be, a constant current is obtained, and that current will be pure dry air, because the moisture will get thoroughly condensed before it passes through the Ventilators into the vessel. This class of Ventilator is fitted into the port, the ordinary side light transferred to the back of the Ventilator so as to retain the light, and when fitted it does not extend outside the lining. These

Ventilators are constructed of ⅜ inch malleable cast iron, and are as strong as any part of the vessel.

How to build a Saloon Skylight is a question that deserves very close consideration. As in the engine-room skylights, the present system means a vast amount of expense for light ornamental work, that a sea may, and often does, carry away any minute. To overcome this difficulty we have designed a Ventilator for fitting on the inside of the saloon skylight combings. By this means we have a permanent iron cover on the top, and obtain an equivalent to an open skylight, as well as a perfect light. This Ventilator being constructed of $\frac{7}{16}$ inch iron, and glass 1¼ inch thick, the combings and top being iron, the skylight will stand any sort of weather the vessel might have to pass through, and we are satisfied there can be little danger of its being carried away.

Our Class II. Deck Ventilators are constructed of ⅜ inch wrought iron. No. 1 is 10 inches diameter; No. 2, 20 inches diameter, the latter having a 9-inch diameter glass in the top, which supplies a perfect light through it. They stand two feet two inches high. It will be obvious on inspection, that they are capable of standing any sort of weather, however bad it may be. It is clear that a permanent fixture, that the worst weather cannot remove, is what is wanted, and as our appliances have not to be removed when the vessel encounters heavy weather—being thoroughly watertight, they do their work efficiently in bad weather as well as fine.

HYDRAULIC TUNNEL CAR.

Hathorn & Co., London.

Second Silver Medal.

Messrs. Hathorn & Co., in addition to their well-known Eclipse Rock Drills, exhibited their Hydraulic Tunnel Car, for carrying the drills in tunnels, adits, or levels. Both the centre column, and the cross bars which take the drills, are fixed by hydraulic pressure. One very great and special recommendation is the lightness of the arrangement, for the car only weighs 11 cwt., and can be easily handled by a couple of lads. The cross bars are raised by turning on a screw on the column, and the carriages are run out and in by working on a flat groove in the bottom of the bar, and can be fixed at any angle or point required.

BOYLE'S PATENT VENTILATORS.

R. Boyle & Son, London.

First Bronze Medal.

Messrs. Boyle made a very extensive display of Ventilating Apparatus. Their new Chimney Cowl is really an adaptation of the principle of their Air-Pump Ventilators, which are too well known to need description.

This cowl is composed of a cylinder set into, and in prolongation of, the brickwork of the top of the flue. The cylinder, which is made of a diameter in proportion to the different circumstances of the case, is made to swell into a large circular box formed of two truncated cones inversely joined, the aperture at the top of the upper one being of a diameter equal to that of the cylinder. This construction is, in its turn, surmounted by another truncated cone, held up to a certain distance from the lower structure by a few uprights or stanchions, and finally the whole is crowned with a hollow conical cap, also elevated a few inches by stanchions. The inverted funnel-shaped top is constructed to a certain angle, calculated to prevent any beating down wind or air invading and blowing down the flue; one of the two capital defects of a "smoky" chimney is thus completely disposed of. The action of the cowl is as follows: the smoke ascending up the flue strikes before going out of the inside of the top cap, and expands into the conical box, which is at once thus heated by convection, so that a comparative "vacuum" is formed there, which sucks up and creates the desired permanent draught.

Messrs. Boyle's arrangement for Ship Ventilation is the same as that generally adopted by the firm, for the ventilation of houses or public buildings, with this addition, that the inlet is so arranged that no water can possibly enter the pipes that convey the air to the various parts of the ship, and in this lies the whole gist of the application. The Inlet Ventilators, which can be arranged to ventilate the hold, engine-room, saloons, &c., are fixed upon the deck; the pipes in connection are carried to the parts requiring ventilation, and the orthodox vertical tubes are fixed in the required positions at the sides of the cabins or holds, for the admission of fresh air, the vitiated air being carried off in the usual manner by other pipes in connection with their ordinary air-pump ventilator. The Inlet Ventilator has four openings for the admission of fresh air, contracted towards their entrance to the interior, where they converge into one, and near the deck line an opening of suitable dimensions is provided, so that in the event of a storm or shipping seas, the water that may enter at the top runs on to the deck. Inside and about one-third of the length from the bottom, an oblong tube of a syphon character is fixed opposite the outlet for the water already named. At the lower end, at the bottom of the curved bend, a series of louvres are arranged, so as to cause every drop of water that may enter it to pass out into the main escape passage. The pipe now rises, takes another curve, and is carried down to the deck line, where the tubes to be carried to saloons and other parts of the vessel are jointed to it. The louvres act in a double capacity, or have two distinct uses. The emission of the water is the most important one, but being opposite the main outlet for the water, they help to draw in air from this source when the weather is calm; in fact the two currents meet here, and the latter helps to carry the former in its up passage through the syphon tube. It is scarcely possible to imagine that the minutest quantity of water can ever find its way forward beyond the louvres.

THE "TRIUMPH" VENTILATORS.

LAMB & CO., LONDON.

First Bronze Medal.

The well known "Triumph" Ventilators are a combination of fixed and moving cones; for which it is claimed, that they are a "sure preventative against down-draught and suction, also proof against the entry of rain and snow; perfectly noiseless, and most powerful Ventilators made." They have continuous ac in the slightest breeze and intense action in strong winds; need no attention after once being fixed. All the air that pa over the fixed cone is conveyed to the centre by the guides, a at the same time the revolving cones take in all the air that come in contact with them. The air is then condensed to double pressure and twisted over the cone's mouth [illegible] rope, which makes the centre of this Ventilator [illegible] of action. It does not matter from which point or how the wind blows, it is always conveyed to the centre in a spiral form before it exits on the off-side.

The power of these Ventilators can be increased to almost any extent, as they can be made with from one to any number of cones, rising one above the other, every cone clearing the cone below it, and all revolving over a fixed cone exhaust chamber with directing wind-guides.

The Triumph Railway Carriage Ventilators, for the purpose of compactness, are made with one revolving cone; the Triumph Sewer Ventilators with one and two revolving cones, working only in top oil box, for the sake of economy in construction.

The advantages claimed for the application of Messrs. Lamb's apparatus to Ship Ventilation, are as follows:—Exhaust Ventilation: No contraction of the shaft by internal discharge valve. Any amount of extracting power can be given by increasing the number of revolving cones on the head. The small external space occupied by the head compared with the size of the shaft. It will not admit any sea within the shaft in rough weather. When the vessel is rolling heavy it will not admit any sea, as the external parts are built up at an angle of 60 degrees. Being a revolving body it needs no trimming, and the wave blow is lost by giving to the pressure. It does not create a down-draught when the vessel is travelling with the wind, and receiving force on both sides at one time. It will keep in action with the least wind, and by the least motion of the vessel, and so form a perfect exhaust in the Tropics. It can be fitted with a screw fan and driven by steam or other power, and so add greatly to its power.

Down-Cast Ventilator:—No contraction of the shaft by internal discharge valve. Any amount of fresh air can be supplied by increasing the number of revolving cones on the head. The fresh air is delivered down by pressure. The small external space occupied by the head compared with the size of the shaft. It will not admit any sea within the shaft in rough weather. When the vessel is rolling heavy it will not admit any sea, as the external parts are built up at an angle of 60 degrees. It does not offer so much resistance to the wave blow as a fixed ventilator, and it needs no trimming. In the Tropics, by the least motion of the vessel the air is forced down in a full volume. It can be driven by steam or any other power.

SANITARY PAINT COMPANY, LIMITED.

Griffiths, Berdoe & Co., Liverpool.

First Bronze Medal.

Messrs. Griffiths, Berdoe & Co., sent samples of their enamel paint, which dispenses entirely with the use of varnish—two coats being considered equal to three of ordinary paint and one of varnish, as illustrated by the examples sent. Like the other manufactures of the firm, this enamel is sanitary in composition. It dries quickly, with a hard glazed surface like porcelain. Being absolutely non-porous, it is an excellent protective covering for iron bridges, viaducts, girders, gasometers, roofing, and all kinds of exposed metal work. For high-class decorations, and as a substitute for expensive glazed tiles, it is also of the highest value. Walls coated with it are rendered perfectly damp proof. It is most valuable for walls of Hospital Wards, &c., as disease germs cannot lodge on it, and it will bear any amount of washing with soap and water, or disinfectants. Baths, bedsteads, &c., and other iron work painted with it do not require "stoving." The Enamel Paint can be made to dry dead when the gloss is objectionable, and in this form is peculiarly adapted for use in dining rooms, bedrooms, halls, corridors, staircases, &c. It dries much harder than ordinary "flatting," and will bear constant washing.

SPRING HARNESS AND SLIP HOOKS.

Alexander & Co., London.

First Bronze Medal.

These hooks are fastened and released momentarily by the adaptation of little spring bolts, which render them absolutely secure. The Judges noted that the principle could be applied with advantage for hauling and landing kibbles.

WARNERISED FABRICS.

James Sinclair, London.

First Bronze Medal.

Mr. Sinclair obtained a first bronze medal for a variety of Warnerised goods, including an umbrella tent, hammock, line and nets. "Warnerisation" is a new process for rendering textile fabrics water repellent, and preventing moth and mildew. It does not affect colour, and when applied to clothes permits perspiration to pass off.

INSTANTANEOUS HOSE COUPLING.

James Sinclair, London.

First Bronze Medal.

Mr. Sinclair also had a first bronze medal for new Hose Coupling which fastens instantaneously,—a most important matter when time is so valuable, as it always is in case of fires.

THE GOSLING PATENT BOILER FUEL ECONOMISER.

R. W. Tayler, Bury St. Edmunds.

First Bronze Medal.

The Gosling Boiler Fuel Economiser consists of a series of discs, placed at intervals in the flue that runs through the boiler. The discs are specially manufactured of the best fire-clay; they are about 2½ inches thick, and eleven inches smaller in diameter than the diameter of the flue. They are each made in three segments, grooved into each other but detachable, thus allowing for expansion and contraction, and facilitating the process of applying them and of removing them when needful for cleaning or inspecting the boiler. Each disc stands on two feet (also made of fire-clay), which fit into holes at the bottom of the disc. Either two or three discs, according to the length of the boiler, are placed in each flue; and they are placed eccentric to the flue—that is to say—the space left for draught above them is about two or three inches, and the space left for draught below them about eight or nine inches. The application of the Economiser is very simple, as the discs are merely placed at certain distances along the flue. There is no fixing whatever required, as they simply stand. They require no skilled labour to apply them, as any ordinary fireman can place them in the flue, when it is cool, in about an hour.

The principle of the "Economiser" is to utilise the heat generated by the furnace in the flue inside the boiler, and not in the flues outside the boiler. This is done by causing the whole interior surface of the boiler flue to become an efficient heating surface. The space left for draught above the discs being much smaller than that left at the bottom and sides of the discs, the flame and hot gases, after leaving the bridge of the furnace, are forced, instead of ascending and traversing the top of the boiler flue, mainly to impinge against the whole circumference of the boiler flue, and especially against the bottom part, where the heat is of the greatest advantage, as it will ascend. This also causes an equal expansion of the plates of the flue, and prevents their being worn away at the top more than at the bottom and sides. The space for draught in the flue being narrowed by the discs, and the heat in that space being increased, the draught of the furnace is greatly improved; and thus a better combustion of the fuel is secured, and the quantity of unconsumed smoke passing away over the bridge of the furnace is much reduced. Moreover, as all the discs become very hot, any smoke that may still come from the furnace impinging upon them is consumed, and converted into heat-giving fuel, instead of being a nuisance and a waste.

AUTOMATIC SAFETY-SHIELD FOR CIRCULAR SAWS.

R. W. Tayler, Bury St. Edmunds.

First Bronze Medal.

The Shield is made of steel 1½ inch deep, and is the same thickness as the saw. In front is a projection by which it is raised with the wood to be cut. The shield is received at the back by a revolving arm, held eccentric with the saw, and balanced by a counterpoise. There are rollers to hold the shield true over the saw. The shield is provided with a locking catch, and sets itself in any elevation; and also with a stopping pin, which prevents it giving way, and a man's hand striking the saw should his hand slip over the wood on coming up to the saw. When a piece of wood comes up to the saw to be cut, by its pressure against a little projection (imperceptible to the worker), the shield revolves or rises before it, and rests upon it until cut through by the saw. Being thereby released, the shield is brought back instantly to the starting point again by a counterpoise, ready to be operated upon by the next piece of wood in the same manner.

AUTOMATIC BELT FASTENERS.

Davey, Sleep & Co., St. Germans.

First Bronze Medal.

This Automatic Belt Fastener is a device of equal simplicity and value. It is simply a bevelled clip through, or rather into, which the ends of driving belts are passed, the arrangement being such that the heavier the strain the tighter the grip. They have been thoroughly tested in practice and found to save both material and time, and to be every way effectual.

CANVAS VALVES.

J. Mayne, Pool.

First Bronze Medal.

A series of Canvas Valves were shown by Mr. Mayne, of Pool, which have been proved for some years in actual working, and have been found to last two or three times as long as indiarubber, while they do not cost more than a third or a fourth as much. They are made, moreover, of what has hitherto been a waste material, the cuttings from the manufacture of tin sacks. Canvas valves have often been used as a makeshift, but Mr. Mayne is the first by whom they have been made for permanent use.

PATENT DIFFERENTIAL SELF-FEEDING RATCHET BRACE.

LEWIS OLRICK & CO., LONDON.

First Bronze Medal.

The novelty of this Brace consists in its being not only self-feeding, but in the fact that the feed can be varied in accordance with the size of hole to be drilled. It is self-contained, does not require any "tommy" or spanner, and saves more than one-half the time in drilling, while it does not tire a man by requiring him to stop and start continually. Moreover the drills are not broken by unequal feed, and the holes are as true as if made under a machine. The Brace is as strong and can be handled as roughly as the commonest tool in the market.

PATENT STEERING PERAMBULATOR.

SIMMONS & CO., LONDON.

First Bronze Medal.

The advantages of this Perambulator are set forth as follows:—The position of the handles gives more than ordinary comfort and power in pushing the Perambulator; they are grasped with the palms facing towards each other as in shaking hands. This relieves the twist of the arms necessary when the palms face downwards. The Perambulator is steered by moving the right handle from side to side, without lifting the front of the Perambulator or raising any of its wheels from the ground. This is perfectly simple. The handle has only to be pointed like a pistol in the direction it is desired the Perambulator should travel, and the carriage immediately turns in that direction, and in turning, it describes a curve and not a number of angles, as is the case with ordinary Perambulators. Thus the children are not jolted by the unnecessary tilting up of the front wheels, and the Perambulator has not to be moved bodily round.

It is only necessary to move the handle, and the vehicle will pass smoothly round corners, through a crowd, or along a winding path.

This arrangement does not in the slightest degree interfere with the necessary lifting of the Perambulator over kerbstones, &c. It cannot be perceived, when pressure is applied upwards or downwards, that the handle is movable at all. The position of the wheels being controlled from the handles, it follows that the constant swerving from the straight course noticeable in many Perambulators, giving so much annoyance and wearing out the springs and tires, is at once done away with.

GAS GRILLER.

Beynon and Cox, Torquay.

First Bronze Medal.

This is an exceedingly handy, compact, and cheap arrangement, forming a complete Cooking Stove for a small family, at the minimum of cost.

The 10/6 size will cook two large chops, or toast six slices of bread, and boil two quarts of water, ten times for one penny; and the large size eight chops, or twelve slices of bread, and boil three quarts of water in seventeen minutes, four times for one penny. The latter Stove will also cook a fowl or small joint to perfection. No gas fumes are allowed to come in contact with food cooked.

WELLS'S UNBREAKABLE LAMPS & OIL FEEDERS.

R. W. Tayler, Bury St. Edmunds.

Second Bronze Medal.

The Patent Cast Metal Unbreakable Lamps and Oil Feeders, invented by Mr. Wells, were shown in various forms. Their strength and durability were manifest; and about a quarter of a million are already in use. They may be employed with advantage for many purposes in mining.

In the Horizontal Oil Feeders, the bodies are of cast metal annealed, rendering them practically unbreakable. The handles are of wrought iron cast in, making it impossible to tear them out without breaking the can. The spouts are of ⅜ inch brass, drawn solid at the noses and screwed into the can, allowing of their being removed and replaced at any time in case of damage. The springs are of tempered steel, and the whole valve is of the simplest construction.

There are no springs in the Vertical Feeders. A hole drilled in the tube beneath the collar allows the oil to pass into it, but not in a sufficient quantity to choke it, permitting the air at the same time to pass up the tube and get into the back of the can.

PORTABLE RAILWAY AND PLANT.

Bolling and Lowe, London.

Highly Commended.

Light, inexpensive, Portable Railways, which can be laid down by unskilled labour, are of great value as feeders for main-line railways, and also for more extended use in transporting materials over comparatively short distances in manufactories, brickfields, gasworks, farms, plantations, mines, &c. Messrs. Bolling & Lowe's principle is equally simple and handy. Where the materials are taken from various directions, as in clearing fields, sugar cane crops, &c., the whole railway is taken up in segments,and relaid where required. Large quantities of minerals and goods may be carried by it, as it is only necessary to proportion the waggons and loads to the carrying capacity of the rail, while heavy weights, such as large balks of timber, are distributed over two or more waggons with bogie or swivelling frames.

In constructing roads, earthworks, embankments, &c., by the portable railway, one man can move four times the quantity of material he can move with a barrow.

The system is based on the distribution of weight over several small waggons, laid on rails and sleepers, which spread the load over a large surface. Any person who has seen the progress of a two or a four-wheeled cart over soft ground will appreciate this plan of distribution of weight. The railway is made in lengths that can be easily carried by one man, and the method of fixing is so simple that a great distance may be laid in a few hours by two inexperienced men. For convenience of transport and shipment, the rails and sleepers are sent separately and the fastenings are packed in strong cases. When the lengths are once put together they are transported bodily, and need not again be taken apart. Switches and crossings, for passing from one line to another, are made in two pieces, which can be carried by two men. They are made of the same section of rail and sleeper as the railway, and only require to be laid in conjunction with the ends of the railway to be ready for use. The angle at the crossing is of chilled cast iron.

UNIVERSAL SECTOR.

J. P. MAGINNIS, M.I.M.E., WESTMINSTER.

Highly Commended.

The "Universal" Sector is an instrument designed (and originally made in cardboard by the inventor, for his own use) for the purpose of dividing any given line into any number of equal parts, more especially twelve parts, to form a scale of inches, ten parts to form a decimal scale, and so on; but its peculiar form soon suggested other uses for which it seemed to be specially adapted. The inventor was led to design the Sector from the fact that a large number of lithographed mechanical drawings are, from time to time, placed in his hands, from which it is necessary to obtain accurate measurements, but as these drawings are always more or less shrunk owing to the process of lithography, or washing in water, as in the case of blue prints, ordinary scales are of no practical value for taking the measurements. A "shrunk scale" must therefore be constructed, which will allow for the shrinkage the drawing has undergone, and this is done as follows:—A known dimension or distance is taken from the drawing as a standard, say one foot, and this distance being marked off on a strip of paper, it is very easy, by the aid of the sector, to divide it into twelve equal parts, representing twelve inches.

THE "FIRE QUEEN."

JAMES SINCLAIR, LONDON.

Highly Commended.

The "Fire Queen" is the latest and most improved form of Dick's well-known chemical fire exterminator "L'Extincteur."

It is noted that while nearly 100,000 Extincteurs have been sold, nearly 11,000 fires have been extinguished by their use alone.

Mr. Sinclair also exhibited Tyndall's "Smoke Respirator," which is a filter for the separation of the pure air, from an atmosphere charged with impurities detrimental to the healthy action of the lungs, and also for the absorption of certain gases of a deadly nature. The system of filter is that spoken of and recommended by Professor Tyndall, in his popular lectures upon "Dust and Smoke."

SAFETY SKIPS AND ATTACHMENTS.

Several plans and models of Safety-Skips and attachments were shown, the spirit of invention having been developed by the sad catastrophe at Wheal Agar.

Mr. Bennetts, of Roskear, who invented the Safety-Skip in use in South Frances 25 years since, sent a model of a skip and cage on his improved plan. In the skip the action of the catches is caused by two side rods connected to the bow, which has a long slot-hole in the eye to allow the bow to drop. These side-rods are continued to the bottom of the skip, and connected to springs bearing against a cross-bar. The bottom of the skip is hung to admit of its rising in front, and giving vent to the springs in passing any sharp angles or underlie when empty. This rise can be adjusted with the underlie. When the skip is loaded the weight of the load keeps down the bottom, bringing the springs and catches into full action. In the cage the action of the catch is caused by the bar to which the cage is suspended, passing through the centre. At the bottom is a cross-head, and two side rods leading to the catches. The centre bar is actuated by a spring bearing against the bottom of the middle platform. This is hung on hinges to admit of its rising and easing the springs in passing sharp turns. The platform can be kept down by levers if the weight of the men is not sufficient. This was considered by the Judges by far the best plan shown; but they thought it open to further improvement. One point suggested was that the clutch gearing should be within the cage.

Mr. W. F. Matthews, of Truro, sent a large model of a cage with a self-acting safety appliance of a very ingenious character. It consisted of four eccentric clutch wheels, one travelling on each side of the two cage guides. Each pair of wheels is coupled by an axle, on the centre of which is a pulley, geared by a chain to the hauling belt. The wheels are toothed on their longer diameters. When all is well, as the shorter diameters of the wheels travel next the guides, the cage ascends freely. If the rope breaks the restraining chains release the pulleys, the eccentrics come into play, and the teeth grip the guides with absolute certainty and precision. Here the principle was approved, but its application considered unsuited for the conditions of Cornish mining.

A double model sent by Mr. Bosistow, of Perran, dealt not only with the danger of breaking ropes but of overwinding. The latter is prevented simply by an attachment to the rope pressing against and lifting a notched guard which actuates a brake. The clutch is also of a very simple kind. The bow is in two parts, each hinged at the side of the cage, and each terminating outwards in a sharp point. When the bow is in its normal position these points are out of the way. If the rope breaks the two halves of the bow fall inwards, and the points fly out and catch in the guides. The detail here was regarded as defective, though the simplicity of the proposal was approved.

Mr. Joseph Richards, of Hayle, forwarded a safety-clutch arrangement, which had a very noteworthy feature in the simplicity of its releasing gear. It required however, guides of a new description, with a ribbed channel. A spring catch is fitted on each side of the cage, which is kept from operating while the bow of the cage is in an upright position by a kind of wedge-shaped flange, produced on each side. If the rope breaks the bow falls, the springs are released, and the ribs are at once caught. There is no doubt as to the efficacy of this plan, but it was regarded as inapplicable in the county.

Mr. Tregonning, Stithians, had a plan which worked easily and well in model by means of a couple of toothed sectors, operating very much upon the same principle as Mr. Matthews's. The Judges believed, however, that there was not sufficient grip for a cage to maintain its position when loaded.

Mr. Clarke, Starcross, sent a sketch of the safety brake invented by Sir W. Armstrong for the hoist used in Grimsby hydraulic tower. The catch is an eccentric wheel with toothed edge, kept away from the guide by a spring when in ordinary use. When the lift rope breaks a chain is set loose, and the spring brings the toothed wheel against the wooden guide. The greater the weight the firmer the hold.

NICHOLLS'S PULVERISER.

Capt. Nicholls, Redruth.

This Pulveriser is a cylinder with a revolving barrel working upon a false bottom. The cylinder is 24 inches in diameter, and the barrel 3 inches less. There are four rubbers, each consisting of three segments in one casting. The rubbers are 7 to 8 inches wide by 18 inches in length. There are slots between the rubbers, and the bottoms are also perforated throughout. The cylinder is horizontal, and the stuff is fed at the side and discharged at the back, about 5 inches from the bottom. The levers, which form a special feature, are at each end of the Pulveriser, lifting at pleasure, and by taking up the weight materially reducing the friction. The material of the machine is cast-iron.

PRYOR'S PULVERISER.

A. Pryor, St. Austell.

The special feature of this Pulveriser is that the tub into which the stuff is fed revolves and not the weights, and that there is an eccentric motion given to the latter. The tub is 40 inches over, and is made of wood, with iron bottom. This it is claimed will last much longer than iron only for burnt leavings. The discharge is through the centre or upright shaft, where the water is comparatively still. The eccentric action given to the weights gives them a rolling motion, and lifts them to enable the rough grains to pass. The weight on the rubbers is regulated by levers.

TEAGUE'S PULVERISER.

Capt. Teague, Junior, Carn Brea.

This Pulveriser is an adaptation and improvement on the horizontal drum machine. The special feature is a very clever and effective arrangement for lifting the shaft through the crown wheel without interfering with the working of the gear, or stopping the engine.

MODEL OF NICHOLLS'S ENGINE SHAFT, VIOLET SETON.

J. M. MARTIN, CAMBORNE.

Mr. J. M. Martin sent an excellent model of Nicholls's engine shaft at Violet Seton, which was sunk 80 fathoms and the pitwork fixed complete in 80 weeks, by an average of 14 men, and without accident. Three special features were noted—(*a*) The sliding pump-rod, which enabled men to sink 4 fathoms without bringing the rods to surface to be lengthened; this is done by a screw and bracket arrangement. (*b*) The sliding casing-door, which was worked successfully in sinking two engine shafts between 80 and 90 fathoms without accident, all the stuff being drawn with a steam whim. The door is kept low enough, should anything fall, to prevent accident. (*c*) Safety gates, which are thrown down after the kibble passes through. Worked by the aid of a balance, these gates can be attended to by a boy. Stuff can, of course, be drawn from the level where the gates are hung, without danger to the men in the bottom of the shaft. The Judges failed to recognise novelty here, save in the point of the sliding casing door, but were glad to see the model, as a proof of the attention paid to improvements in pitwork, and shaft sinking.

RUSTLESS IRON.

BOWER-BARFF RUSTLESS IRON COMPANY, LONDON.

The Bower-Barff process of protecting iron from rust consists in merely placing the articles to be coated in a specially constructed muffle or furnace, and subjecting them to the action of superheated air or carbonic acid gas or steam, forming a protective coating of magnetic oxide, which is rustless. The muffle or furnace may be applied to other purposes if required.

The process, including royalty, is far less costly than galvanising or tinning. The cost lies in heating the articles, and in the labour of handling them, for there is no direct application of any substance whatever. It is applicable to cast and wrought iron and steel in every shape, and for a great variety of art work, it ornaments as well as protects. The colour of the coating varies from a french grey to a black, but for art purposes the more costly metals may be deposited on the magnetic oxide by a simple and inexpensive process. It is also capable of being painted, japanned, or enamelled.

BLAKE'S IMPROVED PATENT STONE BREAKER, OR SECTIONAL CUSHIONED CRUSHER.

LEWIS OLRICK & CO., LONDON.

A three-sided framework of cast iron, with broad flanged base, holding the movable jaw in suspension, forms the front part of this machine, between the upright convergent jaws of which the stone is crushed. The jaw shaft is held in place by wrought iron or steel clamps, which serve to take part of the strain due to crushing in the upper part of the jaw space, and also as walls thereof. In the lower part of the three-sided frame or front part of the crusher, and on each side of it, are holes in the castings to receive the main tension rods which connect the front and rear part of the machine. The rear part is called the main toggle block, and is also provided with holes for the tension rods corresponding to those in the front casting. These two parts of the machine are connected by the main steel tension rods, each provided with screw, thread and nuts, by which their lengths and the jaw opening are readily adjusted to crush coarse or fine, as may be desired. The front and rear castings are supported on parallel timbers, to the under side of which are bolted the boxes carrying the main eccentric shaft, provided with fly wheels and pulley. The timbers are thus made component parts of the machine, and take the transverse strain which comes upon the pitman connecting the main shaft and the toggle joint, placed in the rear of the movable jaw, and between it and the main toggle block. Between the broad flanged bases of the front and rear castings and the timbers on which they rest, are placed flat rubber cushions one quarter to three-eighths of an inch thick. Every revolution of the shaft brings the toggles more nearly into line, and throws the swing jaw forward; and in this way a short reciprocating or vibratory movement is communicated to the movable jaw.

The crusher is sectional, the heaviest piece in a machine, 15 x 9, is about 2,400 lbs.

PATENT SOLIDIFIED OIL.

A. B. Fleming & Co., Edinburgh.

Messrs. Fleming & Co., of Edinburgh, had a fine sample of their Patent Solidified Oil with their Lubricators. The melting point of the oil is that of boiling water, and though solid it is soft, unaffected injuriously by cold, and adapted for use wherever tallow and suet are applicable, on every class of machinery. It is made in four qualities respectively, suitable for use in shafting and fast running light machinery, heavy bearings, for rolling mills, and steam engine cylinders. The advantages claimed are:—"Enormous economy. Great cleanliness in the machine rooms. The minimum quantity of the Solidified Oil is used. Causes the engineer less trouble. Ease of application. Not affected injuriously by heat or frost. As it does not melt when heated (under 212° F.), it does not run out of bearings as would tallow and all other greasy substances, hence its value in bearings liable to heat or for working in tropical countries."

BUSCH'S PATENT GAS GOVERN

F. Clarbour, Glasgow.

In this Governor the mercury trough is cast in the metal body, so that it cannot break and allo to escape. It is easily fixed to the outlet pipe of dry meters of any size, and when once adjuste further attention.

MACDERMOTT & GLOVER'S HAND-LABOU PERCUSSIVE ROCK PERFORATO

Glover & Hobson, London.

Messrs. Macdermott and Glover exhibited two of power drills, constructed to be worked by two men ; given by a strong coiled buffer spring, the tool being by four cams. At 70 revolutions a minute, which is about the normal speed, 280 blows, therefore, are feed is perfectly automatic, and no adjustment is nee being driven to its full length as required.

An ordinary smith can do all that is necessary the drill in working order, and all the parts are ma strong to stand rough usage. The machine is sim admit of being taken to pieces and set up again wi culty; and it is adapted for transport in countries roads, and in mountainous districts, as it can be ca in sections. The same Perforator can be worked quarry or tunnel frame.

	£	s.	d.		£	s.	d.
				,, Gas and sundries	[illegible]	[illegible]	[illegible]
				,, Repairs, coal, cleaning, postages, and incidental expenses ...	19	18	3
				,, Balance	25	0	8
	£277	1	6		£277	1	6

ASSETS.				LIABILITIES.			
Balance brought down	25	0	8	Bills due, estimated	12	0	0
				Balance in favour of the Society ...	13	0	8
	£25	0	8		£25	0	8

Examined with vouchers and found correct.

Falmouth, 16th January, 1884.

W. SLADE OLVER, } **Finance Committee.**
HOWARD FOX, }

Treasurer in account with the Royal Cornwall Polytechnic Society,

1883.

Dr.

	£	s.	d.	£	s.	d.
To Balance from 1882 in Tweedy, Williams & Co.'s hands... ...	9	5	1			
Ditto in Cornish Bank Limited	242	9	7			
				251	14	8
Royal Donations				10	0	0

Cr.

	£	s.	d.	£	s.	d.
By Salaries, and Travelling Expenses of Secretary				76	19	0
L. C. Wyon for Medals, 1883...	39	16	0			
Ditto ditto arrears, 1882	6	12	10			
				46	8	10

LIABILITIES:

	£	s.	d.
Bills due, (estimated)	5	0	0
Balance in favour of the Society	162	10	6

Examined with the vouchers and found correct,

W. SLADE OLVER, } *Finance*
HOWARD FOX, } *Committee.*

The Hon. Secretary of the Meteorological Committee in Account with the Royal Cornwall Polytechnic Society.

Dr.				Cr.			
1883.	£	s.	d.	1883.	£	s.	d.
Dec. 31.				Dec. 31.			
To Balance from 31st Dec., 1882	14	5	6	By salaries, additional allowances and expenses	113	16	0
„ Grant received from the Meteorological Office	260	0	0	„ Rent, less property tax, &c. ...	58	3	6
„ Ditto for postages	1	15	0	„ Rates and taxes	9	17	1
„ Fees for data	1	1	0	„ Chemicals and other materials ...	18	3	8
				„ Gas and sundries	32	2	4
				„ Repairs, coal, cleaning, postages, and incidental expenses ...	19	18	3
				„ Balance	25	0	8
	£277	1	6		£277	1	6

ASSETS.				LIABILITIES.			
Balance brought down	25	0	8	Bills due, estimated	12	0	0
				Balance in favour of the Society ...	13	0	8
	£25	0	8		£25	0	8

Examined with vouchers and found correct.

Falmouth, 16th January, 1884.

W. SLADE OLVER,
HOWARD FOX,
} Finance Committee.

Treasurer in account with the Art Union of Cornwall.

1883.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance from 1882	3	14	4	By paid Lake & Co. for printing Articles of Association... ...	0	10	0
„ Dividend from Tweedy & Co....	0	9	9	„ Commission to Agents	2	11	5
„ Sale of 1,153 Tickets	57	13	0	„ Stationery, Postages, &c. ...	1	2	0
„ Commission from Artists ...	3	7	3	„ Lake & Co. for printing Tickets and Advertising	1	19	3
„ „ „ Prize Holders	1	12	0	„ Prizes	58	0	0
„ Short values on Works chosen...	2	4	0	„ Balance	4	17	8
	£69	0	4		£69	0	4
To Balance to next year	£4	17	8				

ROBERT FOX, *Chairman.*

The following is the List of Winners in the ART UNION DRAWING.

The Drawing took place at the Polytechnic Hall, on Friday, September 14th.

Nos.		£	s.	d.
1091	Mr. G. G. Pender, Falmouth	5	0	0
1024	Mr. Harold Downing, Cardiff	1	0	0
1128	Mr. E. O'Vendon, Falmouth	5	0	0
1420	Mr. R. Fox, Falmouth	2	0	0
809	Mrs. Williams, Helston	1	0	0
1195	Mr. E. C. Downing, Cardiff	2	0	0
1311	Mr. C. F. Phillips, Falmouth	1	0	0
1477	Right Hon. Lord Northbrook	5	0	0
794	Mr. E. W. Newton, Camborne	Extra Prize		
1259	Col. Tremayne, Carclew	3	0	0
493	Mrs. F. W. Michell, (for Redruth Bazaar)	10	0	0
677	Mr. M. H. Williams, Pencalenick	3	0	0
1093	Miss Mary Scott, Falmouth	2	0	0
1288	Sir John St. Aubyn, Bart., M.P.	1	0	0
1404	Mr. T. H. Tilly, West Hartlepool	1	0	0
943	Mr. H. Wilson, Lewisham	3	0	0
1216	Right Hon. Lord Northbrook	3	0	0
449	Mr. John Smith, Falmouth	1	0	0
1308	Mr. W. H. Carkeek, Luxulyan	7	0	0
7	Mr. John Burton, Falmouth	2	0	0

List of Donors and Subscribers,

1883.

Donors.

Her Most Gracious Majesty the QUEEN, Five Pounds.

His Royal Highness the PRINCE of WALES, Five Pounds.

Subscriptions from Mines.

	£	s.	d.
The Mellanear Copper Mine Company	2	2	0
Pontgibaud Mining and Smelting Company	2	0	0
The Linares Lead Mining Company	1	1	0
The Alamillos Company	1	1	0
The Fortuna Company	1	1	0

Subscribers in the County of Cornwall.

Those marked with an asterisk are Members of the Committee.

	£	s.	d.
*Anderton, E. D., *Falmouth*	0	5	0
Anderton, Mrs., *do.*	0	5	0
Aylmer, Major-General, *do.*	1	0	0
Banks, E., *do.*	0	5	0
Banks, Mrs., *do.*	0	5	0
Banks, W., *do.*	0	5	0
Banks, J. R., *Penryn*	0	10	0
Barclay, J., *Falmouth*	0	10	0
Barclay, Miss, *Meudon*	1	1	0
*Barham, C., M.D., *Truro*	0	10	0
Barham, Rev. F. C., *Mabe*	0	10	0
*Basset, G. L., *Tehidy*	1	1	0
Batting, Mrs. Norman, *Falmouth*	0	5	0
*Beauchamp, E. B., *Trevince*	0	10	0

	£	s.	d
Bennett, Rev. J. H. P., M.A., *Falmouth*	0	5	0
Bennett, Mrs., *do.*	0	5	0
Bennett, Miss, *do.*	0	5	0
*Bennetts, J. P., *do.*	0	10	0
*Bennetts, S., *do.*...	0	10	0
*Bolitho, T.S., *Penzance*	1	1	0
Bolitho, W., jun., *do.*	0	10	0
Bolitho, T. R., *do.*	1	0	0
*Borlase, W. Copeland, M.A., M.P., *Laregan*	0	10	0
Boulderson, Miss, *Falmouth*	0	5	0
*Bowles, F. J., *do.*	0	10	0
Bowles, Mrs., *do.*...	0	5	0
Broad, R. R., *do.*...	0	10	0
Broad, Sydney, *do.*	0	5	0
Broad, Mrs. S., *do.*	0	5	0
Broad, Miss, *do.* ...	0	5	0
Broad, Miss G., *do.*	0	5	0
*Broad, William, *do.*	0	10	0
Broad, Mrs. Wm., *do.*	0	5	0
Broad, Herman U., *do.*	0	5	0
Brown, Miss Ellen, *do.*	0	5	0
Brown, Miss Sarah R., *do.*	0	5	0
*Bull, Rev. G. T., M.A., *Camborne*	0	10	0

	£	s.	d.
Bull, M.V., *Roscarrack, Falmouth*...	0	10	0
Bull, Mrs., *do.* ...	0	5	0
Bullmore, W. K., M.D., *do.*	0	10	0
*Bullmore, Ernest, *do.*	0	10	0
Buller, J. F., *Morval, Liskeard* ...	2	2	0
Cardew, Mrs., *Falmouth*	0	5	0
*Carew, W. H. P., *Antony, Devonport*	1	0	0
*Carlyon, Rev. C. W., *St. Just* ...	0	10	0
Carne, E. C., *Falmouth*	0	10	0
Carne, Miss, *do.* ...	0	5	0
*Carne, W. Naylor, *St. Agnes, Scorrier*	0	10	0
Carne, Mrs. W. N., *do.*	0	5	0
Carne, Miss, *Penzance*	1	0	0
Carne, Mrs. Fred., *Falmouth*	0	5	0
*Carter, R. H., *Truro*	0	10	0
*Carter, R., *Falmouth*	0	5	0
Carter, Miss, *do.* ..	0	5	0
Carter, Ben., *do.* ...	0	5	0
*Clift, Mrs., *do.* ...	0	5	0

	£	s.	d.
Cox, Henry, *Falmouth*	0	10	0
Cregoe, J. P., *do.*	0	5	0
Cregoe, Mrs., *do.*	0	5	0
Cregoe, Master, *do.*	0	5	0
Christoe, W. H., *do.*	1	0	0
Cuttance, E., *do.*	0	10	0
Dash, Miss, *do.*	0	5	0
Daubuz, Rev. J., *Killiow, Truro*	1	0	0
Davidson, C., *Falmouth*	0	15	0
Downing, Mrs. J. V., *do.*	0	5	0
Downing, S. T. G., *Penzance*	0	10	0
Earle, F. H., *Falmouth*	0	10	0
Enys, F. G., *Enys*	2	2	0
*Falmouth, Right Hon. Viscount, *Tregothnan*	2	0	0
Fenwick, Miss, *Falmouth*	0	5	0
Field, T. W., *Marazion*	0	10	6
Fitz Gerald, Major-General C., *Falmouth*	0	5	0
Fitz Gerald, Mrs., *do.*	0	5	0
Fitz Gerald, J. C., *do.*	0	5	0
Fitz Gerald, C. M., *do.*	0	5	0
Foster, Richard, *Lanwithan*	0	10	0
*Fox, Miss, *Penjerrick, Falmouth*	1	0	0
Fox, H. Backhouse, *Falmouth*	1	0	0
Fox, Mrs. Alfred, *do.*	0	10	6
*Fox, Alfred Lloyd, *Penmere, Falmouth*	1	1	0
Fox, Mrs. A. L., *do.*	0	10	6
*Fox, George H., *Falmouth*	0	10	0
*Fox, Mrs. G. H., *do.*	0	5	0
*Fox, Howard, *do.*	1	0	0
Fox, Mrs. H., *do.*	0	5	0
*Fox, Nathaniel, *do.*	0	10	0
*Fox, Robert, *do.*	1	0	0
*Fox, Mrs. R., *do.*	0	5	0
*Fox, Wilson L., F.R.Met. Soc., *do.*	0	10	0
Fox, Mrs. W. L., *do.*	0	5	0
*Fox, G. C., *do.*	0	5	0
*Fox, Mrs. G. C., *do.*	0	5	0
Fox, G. C., jun., *do.*	0	5	0
Francis, Miss, *do.*	0	5	0
*Francis, Miss A., *do.*	0	5	0
Freeman, Miss H. D., *do.*	0	5	0
Freeman, Miss A. J., *do.*	0	5	0

	£	s.	d.
Freeman and Sons, Messrs. John, *Penryn*	2	2	0
Frecheville, R. J., F.G.S., *Truro*	0	10	0
*Gardner, Rev. C. R., *Falmouth*	0	10	0
Genn, W. J., *do.*	0	5	0
*Genn, Mrs., *do.*	0	5	0
Genn, Miss, *do.*	0	5	0
Genn, Miss J., *do.*	0	5	0
Gilbert, Hon. Mrs., *Trelissick*	1	0	0
Gill, John, *Penryn*	0	10	0
Glencross, Rev. J., *Liskeard*	0	10	0
*Grylls, W. M., *Falmouth*	6	10	0
Grylls, Mrs., *do.*	0	5	0
Grylls, Miss, *do.*	0	5	0
Handcock, E., *do.*	0	10	0
Harris, A. B., M.D., *do.*	0	5	0
Harris, Mrs., *do.*	0	5	0
Harris, Miss, *do.*	0	5	0
*Hart, Thomas, F.S.A., *Lizard, Helston*	0	10	0
Harvey, Robert, *Trewin, Truro*	0	10	0
Haslope, L., *Falmouth*	0	10	6
Haslope, Mrs., *do.*	0	10	6

	£	s.	d.
Haye, Major John, *Redruth*	0	10	6
Heard, E. G., *Truro*	0	10	0
Henderson, Capt. J., *do.*	0	10	0
Hill, F. V., *Helston*	0	10	0
Hockin, G. C., *Hayle*	1	0	0
*Hole, Rev. F. R., *Constantine*	0	10	0
*Hole, Mrs. *do.*	0	5	0
Holman, J., *Camborne*	0	10	0
Hooper, W., *Falmouth*	0	10	0
Hooper, Mrs., *do.*	0	5	0
Hosking, Capt. J., *Camborne*	0	10	0
*Husband, W., *Hayle*	1	0	0
Hugoe, Mrs., *Falmouth*	0	5	0
Hustler, Miss, *Trebah*	0	10	0
*Jago, J., M.D.Oxon., F.R.S., *Truro*	0	10	0
Jeffery, Henry M., M.A., F.R.S., *Falmouth*	0	10	0
*Kennerley, J. C., *St. Mawes*	1	1	0
Kinsman, J. K., *Antron, Mabe*	0	10	0
Lake, Mrs. J. H., *Falmouth*	0	5	0

	£	s.	d.
Lake, Miss, *Falmouth*	0	5	0
Lake, Miss Julia, *do.*	0	5	0
*Lanyon, G., *do.*	0	5	0
Lanyon, Mrs., *do.*	0	5	0
Lanyon, Miss, *do.*	0	5	0
Lavin, Michael, *Penryn*	0	10	0
Lean, W. H., *Falmouth*	0	10	0
Liddell, J., R.N., *Bodmin*	0	10	0
*Mackenzie, H. S., *Falmouth*	0	10	0
Mackenzie, Mrs., *do.*	0	5	0
Mackenzie, Miss, *do.*	0	5	0
Martin, S. Symons, *Trenant, Sladesbridge*	0	10	0
Michell, G. A., *Redruth*	0	10	0
Mount Edgcumbe, Rt. Hon. Earl of, *Mount Edgcumbe*	2	2	0
Oatey, Thos. Hy., *Falmouth*	0	10	0
*Olver, W. S., *do.*	0	10	0
Olver, Mrs. W. S., *do.*	0	5	0
Olver, T. R., *do.*	0	15	0
Olver, Mrs., *do.*	0	5	0
Pendarves, W. Cole, *Pendarves*	1	1	0
Pender, Mrs. Geo., *Falmouth*	0	5	0
Pender, W. R. T., *do.*	0	10	0
Peters, Miss, *Belair, Penzance*	0	5	0
Tonkin, Mrs., *do.*	0	5	0
Phillips, Charles, *Falmouth*	0	10	0
Phillips, Mrs. C., *do.*	0	5	0
Phillpotts, Miss H. C., *St. Gluvias Vicarage, Penryn*	0	5	0
*Phillpotts, Rev. Canon, *Porthgwidden, Truro*	1	0	0
*Philp, J. G., *Falmouth*	0	5	0
Philp, Mrs., *do.*	0	5	0
Philp, Hastings, *do.*	0	5	0
*Pollard, Henry, *do.*	0	5	0
*Poole, J., *Hayle*	0	10	0
Rashleigh, J., *Menabilly, Par*	1	1	0
Rashleigh, Evelyn W., *Kilmarth, Par Station*	0	10	0
Read, J. B., *Penryn*	0	10	0
Read, Mrs., *do.*	0	5	0
Read, Thomas, *Falmouth*	0	10	0
Rich, Capt. W., *Redruth*	0	10	0

	£	s.	d.
*Robartes, Right Hon. Lord, *Lanhydrock*	1	1	0
*Rogers, Mrs. J. J., *Lamorva, Falmouth*	1	0	0
Rogers, Mrs. R., *Carwinion, Falmouth*	0	10	6
Rogers, R. N., *Falmouth*	0	10	6
*Rogers, Rev. W., M.A., *Mawnan*...	1	0	0
*Rogers, Mrs. W., *do.*	0	5	0
*Rogers, Rev. Canon, M.A., *Gwennap*...	0	10	0
*Ross, C. C., M.P., *Penzance*	1	1	0
Sampson, R. A., *Falmouth*	0	10	0
Sara, N., *do.*... ...	0	10	0
*Sawle, Lady Graves, *Penrice, St. Austell* ...	0	10	0
*Scott, W. T., *Falmouth*	0	10	0
Scott, Mrs. W. T., *do.*	0	5	0
Sheriff, J. D., C.E., *Truro*	1	1	0
Shilson, Mrs., *Tremough*	0	10	0
Sisson, W., M.I.M.E., *Falmouth*	0	10	0
Sisson, Mrs., *do.* ...	0	5	0
Smith and Paul, Messrs., *Truro*...	1	1	0
*Smith, George J., *Camborne*	0	10	0
Smith, W. Bickford, *Trevarno*	0	10	0
Smith, W. J. Boase, F.S.A., *Falmouth*	0	10	0
*St. Aubyn, Sir John, Bart., M.P., *St. Michael's Mount*	2	2	0
*St. Aubyn, Lady Elizabeth, *do.* ...	1	0	0
St. Aubyn, Rev. St. Aubyn H. Molesworth, *Clowance*	1	0	0
*St. Germans, Rt. Hon. Earl of, *Port Eliot, St. Germans*	1	1	0
Sterling, Miss, *The Crag, Falmouth*	1	1	0
Sterling, Miss H., *do.*	1	1	0
*Stephens, J., *Ashfield, Falmouth*...	0	10	0
Stephens, Mrs. J., *do.*	0	5	0
Stephens, Miss, *do.*	0	5	0
Stephens, J. C., *do.*	0	5	0
Stephens, Miss Mary, *Falmouth*	0	5	0

	£	s.	d.
Stevens, M., *Falmouth*	0	10	0
Studden, J., *do.* ...	0	10	0
*Taylor, G. H., *Devoran*	0	10	6
Tellam, R. V., *Bodmin*	0	10	0
*Tilly, H., *Boslowick, Falmouth*...	0	10	0
Tregaskis, W., *Falmouth*	0	10	0
Tregelles, Miss M. E., *do.*	0	5	0
*Tregelles, Miss A., *do.*	0	5	0
Tregelles, Miss Anna R., *do.*	0	5	0
*Trelawny, Sir J. S., Bart., *Trelawne, Liskeard*	1	0	0
*Tremayne, Colonel, *Carclew*	2	2	0
*Tremayne, J., *Heligan, St. Austell*...	2	2	0
*Tresidder, W. T., *St. Ives*	0	10	0
Tresidder, S., jun., *Falmouth*	0	10	0
Trethowan, H. S., *do.*	0	10	0
Trevenen, Miss, *do.*	0	5	0
Trevenen, Miss F., *Falmouth*	0	5	0
Trevenen, Miss R., *do.*	0	5	0
*Tweedy, R. M., *do.*	0	5	0
*Tweedy, Mrs., *do.*	0	5	0
Tweedy, Miss Edith A., *do.*	0	5	0
Tweedy, Arthur C., *do.*	0	5	0
*Vyvyan, Rev. Sir Vyell, Bart., *Trelowarren, Helston*	1	0	0
*Vivian, A. P., M.P., *Bosahan*	2	2	0
Waters, Mrs., *Holyrood, Falmouth*...	0	5	0
*Webber, T., *Falmouth*	0	10	0
Williams, Mrs., *Pengreep, Redruth* ...	2	2	0
Williams, Michael Henry, *Pencalenick, Truro* ...	0	10	0
Williams, George, *Scorrier House* ...	1	0	0
*Willmore, A., *Falmouth*	0	10	0
Willmore, Mrs., *do.*	0	5	0
Wymer, F. W., *do.*	0	5	0
Wymer, Mrs., *do.*...	0	5	0
Wymer, D. W., *do.*	0	5	0

Subscribers resident out of the County of Cornwall.

	£	s.	d.
Acland, Henry Dyke, *Stamford, Lincolnshire*	0	10	0
Adams, Professor W. G., F.R.S., *London*	1	1	0
Barratt, Francis, B.A., LL.B., *Plymouth*	1	0	0
Bond, F. Walters, *London*	0	10	0
Brett, R. B., M.P., *do.*	1	1	0
*Brooks, William, *Reigate*	0	10	0
Courtney, Leonard, M.P., *London*	1	0	0
Dymond, E. E., F.R.Met.Soc., *Oaklands, Apsley Guise, Woburn*	0	10	0
Dymond, F. W., *Exeter*	0	10	0
Faija, Henry, *London*	0	10	0
Everard, Mrs., *Eton*	0	5	0
Ford, Mrs. J. F., *Bath*	1	1	0
*Fox, Francis E., B.A., F.R.G.S., *Tamerton*	0	5	0
Fox, Mrs. F. E., *do.*	0	5	0
Fox, F. W., *do.*	0	5	0
Hodgkin, Thomas, *Newcastle-on-Tyne*	1	0	0
Howard, Elliot, *Walthamstow*	0	10	0
Hunt, Robert, F.R.S., *London*	0	10	0
Jenkins, D. J., M.P., *do.*	2	2	0
Latimer, I., *Plymouth*	0	10	0
Morning News Co., *do.*	0	10	0
Northbrook, Right Hon. Earl, *London*	1	1	0
Olver, E. T., *do.*	0	10	0
Oxland, R., F.C.S., *Plymouth*	0	10	0
Pease, Sir J. W., Bart., M.P., *Hutton Hall, Guisbro'*	0	10	0
Pease, John William, *Newcastle-on-Tyne*	0	10	0

	£	s.	d.
Pease, Mrs., *Newcastle-on-Tyne* ...	0	5	0
Pease, Miss S. H., *do.*	0	5	0
Smyth, W. W., M.A., F.R.S., *Geological Museum, London*	1	0	0
St. Aubyn, Walter M., M.P., *London*	1	1	0
Taylor, Richard, F.G.S., *London* ...	2	2	0
Tuckett, F. F., *Frenchay, Bristol*	1	1	0

	£	s.	d.
Tuckett, P. D., *London*	0	10	0
Tuckett, Mrs. P. D., *do.*	0	10	0
Vivian, Ed., M.A., *Torquay*	0	10	0
Watson, Peter, *London*	1	1	0
Williams, Michael, M.A., *Gnaton Hall, Yealmpton, S. Devon*	1	1	0
X. Y. Z.	2	2	0

Report of the Meteorological Committee for the year 1883.

The Observatory has been maintained in good order, and the following particulars of an ordinary week's work, will give some little idea of the daily routine of the establishment.

OBSERVATIONS.—Readings are taken of the dry and wet bulb thermometers and the standard barometer, and observations of weather and cloud are taken regularly at 10 a.m., noon, 2 p.m., 4 p.m., 6 p.m., and 10 p.m. Maximum and minimum temperatures are read in addition to other observations at 10 p.m., daily. At 9.30 a.m. the various clocks, (except the rain gauge) and the chronometer are wound.

RAIN.—The cylinder is taken off the self-recording rain gauge and a fresh one put on, and the clock wound at 10 a.m., daily, and the rain in the copper gauge is measured to ·005 of an inch.

WIND.—The Anemograph sheet is taken off the instrument and a fresh one put on at 10.30 a.m., daily.

BAROGRAPH.—The cylinder is taken off the instrument every other day, between the hours of 10 and 11 a.m.; the photographic papers are then removed from it and a set of fresh sensitized sheets is put carefully on, and the cylinder is again placed in position in the instrument for the next 48 hours' registration of the changes of pressure.

THERMOGRAPH.—The cylinder is removed on the same day as that of the barograph, and also between the hours of 10 and 11 a.m., and treated in a similar manner. After the instruments have been re-started, a developing solution is prepared and poured on a well polished piece of plate glass; the papers taken off the instruments are floated thereon, and the photographs developed. After this process, (which occupies from one to three hours, according to the temperature), the sheets are well washed with fresh water and placed in a fixing bath; when the photographs are properly fixed, they are again placed in a tray of water in order to soak out the hyposulphite of soda.

During the intervals between these processes, the barograph and thermograph curves from the previous "changing day," representing 48 hours, are tabulated for each hour by two independent methods, and the necessary corrections are determined.

On the alternate days when the barograph and thermograph instruments are not interfered with, the anemograph curves—velocity and direction—are tabulated for every hour, and a second and separate tabulation of the direction is made. The rain curves are also measured for every hour during which any rain fell. The tabulations of all the curves—barograph, thermograph, wind and rain—are entered on special forms for the Meteorological Office, and a second copy is made for the Polytechnic Society. The photographs taken off on the previous day are well washed and allowed to soak in water for another twenty-four hours.

SPECIAL WORK EVERY TUESDAY.—A careful tracing is made on a printed form of the bright sunshine recorded on the sun cards, for the week ending on the day previous, and an extra copy is made for the Polytechnic Society. The total amount of sunshine each day is measured, and entered in hours and tenths of hours, and the total for the week is added up. A weekly weather register is also prepared, consisting of entry on printed form of daily maximum and minimum temperatures, (corrected) and the rain, the totals for the week and the means being entered. This register and the sunshine form are posted to the Meteorological Office.

THURSDAY.—Full examination of *all* the registers, tabulations and curves for the preceding week. The various forms are then signed by the observer and the whole of the documents are transmitted to the Meteorological Office. Tracings are made of all the anemograph curves for the Polytechnic Society.

FRIDAY.—A weekly weather table up to 10 a.m. is prepared for the Falmouth *News Slip*.

SATURDAY.—This table is completed to 10 a.m., and posted to the *Western Daily Mercury*.

OTHER PERIODICAL DUTIES.—Half a day once a week, sensitizing sheets for the photographing instruments, and iodizing another set, which after several hours immersion are hung up to dry. Once a month oiling anemometer and verifying the orientation of the wind. Distilling water all day, for use in the various baths; and more frequently filtering rain water for washing baths. Twice a month preparation of table of synchronous observations for the United States Government, and forwarding the same to the Meteorological Office. Frequently putting new cotton threads and muslins on wet bulb thermometers; cleaning thermometers; cleaning and putting fresh lamp glasses on barograph and thermograph; cleaning anemograph, thermometers, mirrors, lenses, rain measure, &c. Making new baths as follows :—Sensitizing, replenishing, iodizing, and fixing ; and preparing gallic acid solution.

The following changes in the staff have taken place.—Mr. F. Skinner, (who during the time of his being an assistant gave entire satisfaction), left at the end of the year, for a situation in the Bidston Observatory, near Birkenhead. Mr. H. C. Oakshott, of Falmouth, has been appointed in his stead.

During an interruption of the Scilly cable, weather telegrams were sent three times a day to the Meteorological Office, from the 20th to the 24th of October, inclusive.

Dr. Radcliffe, of London, who has for some considerable time past been investigating the theory of the tides, and who has had special observations taken at London, Bath, and elsewhere, was during the months of November and December last, supplied at his request with barometric readings, reduced to 32° at sea level, taken at the Observatory at the hours of high and low water. Observations were also made for him on board H.M.S. "Ganges," at high and low water daily, during the same period. These were also reduced by your observer to 32° and sea level. He also carefully compared the aneroid used with the standard barometer at the Observatory, by a series of observations extending over 17 days, to determine the necessary correction to be applied to the aneroid, in order that the observations made on board the "Ganges" might be strictly comparable with those taken at the Observatory at the same hour.

The taking of sea temperatures at the Falmouth Docks, which was set on foot at the expense of the late Mr. Charles Greaves, C.E., in September, 1882, has been continued until the end of this year, when owing to his lamented death it was stopped. The thanks of the Committee are due to Mr. F. J. Bowles, for having kindly superintended the taking of these observations by the Docks Company's staff, twice a day, at 9 a.m. and 3 p.m., and twice a month for 24 consecutive hours. It is sincerely to be hoped that the observations may still be turned to account, and much to be regretted that Mr. Greaves' investigations were cut short by his untimely decease. By permission of his executor, Mr. C. R. Rivington, your Hon. Secretary has prepared a table summarising the results for comparison with those which have been for many years past taken in the Bay, and which will be found with the other tables published in the Society's Annual Report.

Mr. Gill has continued his observations at Helston, and the results have been regularly communicated to the Meteorological Office and to the Royal Meteorological Society. A Meteorological table for Helston, prepared by Mr. Kitto, and a table comparing the climate of Falmouth and Helston, contributed by your Hon. Secretary, will be published as usual with the West Cornwall tables at the end of the Annual Report of the Polytechnic Society. The Committee are pleased to be able to state that the barometer referred to in their Report for last year, (having been purchased from Mr. Casella, with donations from the Polytechnic Society and some private friends, and the sum of £5 5s. 0d., collected by Mr. Gill in Helston), was fixed at Mr. Gill's residence by Mr. Kitto, on the 19th of February, after being compared for some time with the standard instrument at the Observatory, and its correction ascertained to be + ·010. The height of its cistern was at the same time found to be 171 feet, and the top of the rain gauge to be 184 feet above sea level.

The Committee desire to express their acknowledgment to Mr. Gill for the time and energy he has devoted to the work at Helston, and especially for the assistance they obtained through him, in raising the necessary funds for the purchase of the barometer, which has rendered the equipment under his care, complete as a station of the second order.

The Society's Stevenson screen and instruments belonging to the Climatological Station at Falmouth, (which reports monthly to the Royal Meteorological Society), were on the 20th of June removed from 8, Florence Terrace, to your Hon. Secretary's present residence at Carmino, where they are placed in a position which gives the instruments an excellent exposure. A rain-band spectroscope has been added, and since September last observations have been daily made at the same time (viz :—9 a.m. local time), as the temperatures are taken.

Your Committee have had under their consideration the question of providing accommodation in the proposed new Observatory for a set of Magnetographs, and with this view, application has been made to the Royal Society for a grant of £300 to cover the estimated cost of the necessary accommodation and instruments, and also for a sum to cover the cost of their maintenance. Your Committee received a reply to the effect that the sum of £300 had been placed at their disposal for the purposes mentioned, contingently on the Polytechnic Society being able to afford reasonable assurance of the continuance of the observations. Your Hon. Secretary has since been authorized by the General Committee to accept the grant from the Royal Society as above mentioned.

In conclusion, your Committee would express the sincere gratification it is to them to know that the advantages to the science of Meteorology and the public, of an Observatory of the first class at Falmouth, are happily to be continued, and they feel confident that with the new Observatory, a fresh era in the importance and usefulness of this Station will be commenced, which will more than justify the Meteorological Council in the wisdom of the decision which they have arrived at.

WILSON LLOYD FOX,

Hon. Secretary.

Report of the Art Union of Cornwall,

1883.

The Committee of the Art Union of Cornwall have to report that the Annual Drawing took place on the evening of Friday, the 14th of September, at 9 p.m., in the Polytechnic Hall, Mr. E. D. Anderton being in the chair.

That the ticket books were checked by Messrs. Willmore, Anderton, and Phillips, and the tickets by Messrs. Lanyon, Cheesman, Turner, Scott, Downing, and Fox, and again by the whole of the Committee.

That the value of the tickets sold amounted to £57 13s. 0d., which with the balance of £3 14s. 4d. from last year's drawing, made a total of £61 7s. 4d., out of which it was resolved to apportion £58 for prizes.

That the value of the works of art chosen as prizes was £68 2s. 0d.

That the tickets were drawn from the wheels by the Misses Fox and Edgcumbe.

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TABLES

OF

SEA TEMPERATURE, BRIGHT SUNSHINE

AND

CLIMATE AT FALMOUTH,

FOR THE YEAR 1883.

AND

NOTES

BY

WILSON LLOYD FOX, F.R. MET. SOC.

WITH OTHER

METEOROLOGICAL TABLES

FOR WEST CORNWALL

AND

THE SCILLY ISLANDS.

SEA TEMPERATURE. The observations which have been made continuously during the last twelve years in Falmouth Bay, on board the steam tug "Briton" were temporarily discontinued in October last so that the record for 1883 is for ten months only and is as follows.

TABLE SHOWING THE SEA TEMPERATURE OFF FALMOUTH DURING THE FIRST TEN MONTHS OF 1883.

1883.	Number of Observations.	Means.	Difference from Air.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Extreme Range.	Difference from Air.
		°	°	°	°	°	°	°	°
JANUARY.	22	48·9	+2·9	50·5	− 3·6	48·0	+11·8	2·5	−15·4
FEBRUARY.	17	48·4	+3·1	49·0	− 4·7	48·0	+12·6	1·0	−17·3
MARCH. ...	23	46·6	+6·7	49·0	− 4·7	45·5	+18·7	3·5	−23·4
APRIL	23	48·3	+1·1	49·0	− 7·6	47·0	+11·9	2·0	−19·5
MAY	23	52·0	+0·2	55·0	−11.5	49·5	+12·5	5·5	−24·0
JUNE	23	56·7	−0·4	59·9	−10·2	54·5	+ 6·8	4·5	−17·0
JULY	24	56·0	−2·3	57·0	−11·8	55·0	+ 4·3	2·0	−15·1
AUGUST ...	23	57·7	−1·8	60·0	−11·6	56·0	+ 5·3	4·0	−16·9
SEPTBR. ...	12	57·2	+0·5	58·5	− 5·6	56·5	+ 8·5	2·0	−14·1
OCTOBER .	11	56·4	+4·0	57·0	− 2·0	56·0	+13·0	1·0	−15·0
MEANS......	20	52·8	+1·4	54·4	−7·2	51·6	+10·5	2·8	−17·7

The results for the eleven years preceding 1883, will be found in the next table. The absolute maximum observed during this period was 64° in the year 1874, and the absolute minimum observed was 42° in the year 1879, which give an extreme range of 22°. The absolute maximum of the air during the same time was 76° and the absolute minimum was 23° giving an extreme range of 53°. It may be noted that the early months of the year are the cold ones. Thus the mean temperature of the sea in April is colder than in December and the mean temperature of the sea in May is less than that of November and so of June and October.

MONTHLY MEAN TEMPERATURE OF THE SEA OFF FALMOUTH

FOR ELEVEN YEARS,

1872 TO 1882.

INCLUSIVE.

	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	Means.
	°	°	°	°	°	°	°	°	°	°	°	°
Jan. ...	49·3	48·9	49·5	40.4	46·0	50·5	48·6	44·6	45·0	46·3	50·1	48.0
Feb. ...	49·3	45·9	48·0	47·1	45·9	49·8	47·3	44·0	47·1	46·3	48·8	47·2
March.	50·2	46·0	49·1	45·7	45·9	48·1	48·3	46·1	48·6	46·4	50·8	47·7
April ..	50·9	48·8	51·7	48·6	48·3	49·5	48·9	47·9	49·5	47·8	51·9	49·4
May ...	52·0	50·7	54·0	53·1	51·5	51·9	52·4	50·1	52·4	51·5	54·2	52·2
June...	55·1	54·2	57·1	54·3	54·4	55·5	57·2	54·1	54·4	55-3	55·9	55·2
July ...	60·3	56·9	60·2	57-3	58·9		60·2	54·7	56·9	59·3	56·8	58·2
Aug. ...	61·6	57·8	58·2	61·6	60·4	59·6	61·7	58·2	60·3	57·5	59·2	59·7
Sept....	59·6	56·6	58·2	61.3	57·6	58·2	61·0	57·0	61·4	59·7	58·7	59·0
Oct. ...	55·4	56·2	56·2	56·9	57·1	56·7	57·3	55.7	56·9	56·7	57·9	56·6
Nov. ...	52·7	51·9	53·7	54·3	52·9	53·6	50·4	51·9	53·7	54·5	52·8	52·9
Dec. ...	50·3	51·3	48·8	47·1	51·4	50·7	46·3	46·7	51·6	51·2	49·6	49·5
Means.	53·9	52·1	53 7	53·1	52·5	53·1	53·3	50·9	53·1	52·7	53·9	53·0
Diffrnce from air	+2·2	+1·0	+1·9	+1·8	+0·9	+1·5	+1·8	+2·0	+1·6	+2·2	+2·5	+1·7
Max.obs	63·0	61·0	64·0		63·0	61·5	64·0	60·0	64·0	61·0	61·0	
Min.obs	47·5	45·0	46·0		44·0	47·5	44·5	42·0	44·0	43·0	48·0	

The next two tables have been prepared from the observations which were commenced at the request of the late Mr Charles Greaves, C.E., in September, 1882, and have since been regularly continued. They are published with the consent of Mr. Rivington, his executor. The difference from the air and evaporation temperatures mentioned in table No I. have been calculated from the data given by the instruments under my care in a Stevenson Screen. In table No. II. these differences have been worked out from the readings recorded at the Observatory.

TABLES OF SEA TEMPERATURE TAKEN AT THE EASTERN BREAKWATER OF THE FALMOUTH DOCKS AND THE TEMPERATURES OF THE AIR AND OF EVAPORATION AT FALMOUTH

No. I.

1883.	Means 9 a.m.	Difference from Air.	Difference from Wet Bulb.	Means 3 p.m.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Extreme Range.	Difference from Air.
January ...	48°·3	+2°·0	+3°·8	48°·4	51°·0	−4°·0	46°·5	+11°·0	4°·5	−15°·0
February ...	47·4	+2·0	+3·5	48·0	50·0	—5·3	41·5	+ 8·7	8·5	– 14·0
March	45·3	+4·0	+7·3	46·1	50·0	−6·2	43·0	+17·3	7·0	– 22·5
April	48·9	−1·0	+2·9	49·8	52·0	−7·1	46·0	+11·6	6·0	—18·7
May	53·0	−1·5	+3·0	53·8	58·0	−11 3	49·5	+14·6	8·5	– 25·9
June	57·7	−1·0	+3·3	58·6	63·0	−10·1	53·0	+ 8·8	8·0	—18·9
July	57·8	−2·2	+0·8	58·8	62·0	—6·0	55·5	+ 7·5	6·5	—13·5
August	59·1	−2·6	+0·9	60·0	62·5	—11.1	57·5	+ 8·1	5·0	– 19·2
September...	58·3	−0·2	+2·5	59·1	61·0	−3·9	56·0	+ 9·3	5·0	—13·2
October	55·3	+1·0	+3·5	56·1	57·5	−2·6	54·0	+12·7	3·5	– 15.3
November ..	52·6	+3·4	+5·5	52·9	55·0	−1·1	50·0	+11·6	5·6	—15·7
December ..	49·2	+4·0	+5·2	49·4	52·5	−1·3	46·0	+15·3	6·5	- 16·6
Means...........	52·7	+ ·07	+3·5	53·4	56·2	−5·8	50·0	+11·6	6·2	– 17·4

No. II.

1883. 24 consecutive hours, commencing	Means.	Difference from Air	Difference from Wet Bulb.	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Extreme Range.	Difference from Air.
	°	°	°	°	°	°	°	°	°
Mdnght of 16th Jan.	48·5	−2·3	+1·3	49·0	−4·0	48·0	+·05	1·0	−4·5
Noon of 30th Jan.	47·1	+5·0	+7·9	47·7	+3·7	46·5	+7·0	1·2	−3·3
Noon of 14th Feb.	48·3	+0·1	+2·7	49·0	−3·6	48·0	+3·3	1·0	−6·9
Noon of 27th Feb.	48·9	+0·6	+2·5	49·5	−1·5	48·5	+2·5	1·0	−4·0
1 am. 19th of March	44·3	+5·5	+8·5	45·0	+0·9	43·0	+9.1	2·0	−8·2
,, 27th March ...	45·3	+6·5	+10·1	46·0	+2·6	45·0	+10·7	1·0	−8·1
,, 14th April......	49·4	+2·0	+5·5	50·0	−1·2	48·5	+3·3	1·5	−4·5
,, 28th April ...	50·0	−0·5	+2·0	51·0	−2·3	49·0	+0·8	2·0	−3·1
,, 15th May	52·8	—0·6	+1·6	54·5	−3·1	52·0	+2·2	2·5	−5·3
,, 30th May	55·6	+0·3	+4·6	57·0	−5·0	54·5	+6·5	2·5	−11·5
,, 14th June......	61·7	+2·4	+6·9	63·0	−4·0	60·0	+7·3	3·0	−11·3
,, 29th June......	57·4	−1·8	−0·1	60·0	−3·1	57·0	+1·0	3·0	−4·1
,, 17th July......	56·9	−0·2	+3·1	57·0	−4·4	56·5	+3·5	0·5	−7·9
,, 31st July	58·8	+0·3	+3·0	59·5	−4·8	58·0	+3·3	1·5	−8·1
,, 15th August ..	58·2	+1·3	+4·0	59·0	−2·2	57·0	+2·6	2·0	−4·8
,, 30th August...	61·0	+0·7	+2·2	61·5	−6·5	60·0	+3·3	1·5	−9·8
,, 15th Septmbr.	58·2	+1·3	+2·8	60·0	−1·8	57·0	+5·5	3·0	−7·3
,, 30th Septmbr.	56·8	+3·8	+8·1	58·0	+2·3	56·0	+5·2	2·0	−2·9
,, 16th October.	56·3	+1·5	+4·0	57·0	−1·0	56·0	+3·3	1·0	−4·3
,, 31st October .	55·3	+2·6	+6·1	56·0	+2·2	55·0	+3·4	1·0	−1·2
,, 16th Novmbr.	53·3	+5·9	+9·1	52·5	+3·1	52·0	+10·0	0·5	−6·9
,, 29th Novmbr.	52·4	+1·8	+4·3	53·0	+1·0	52·0	+3.0	1·0	−2·0
,, 17th Decembr.	48·0	+8·9	+2·7	48·0	+6·5	47·5	+12·2	0·5	−5·7
,, 1st Decembr.	48·4	+7·7	+1·3	48·5	+6·5	48·0	+8·5	0·5	−2·0

BRIGHT SUNSHINE. In the table which follows will be found the monthly bright sunshine at Falmouth for the last three years. It is noticeable that in each succeeding year there has been a diminution, and that January and December are the months during which there is least, and May and June the months during which there is most sunshine.

On referring to the sunshine records of the United Kingdom for 1881, from thirty-one stations, recently published by the Meteorological Council, the weekly total of sunshine at Falmouth is shown to be greater than at any other, with but one exception, viz., St. Aubin's in Jersey.

Mr. W. W. Rundell has shown in the last quarterly Journal of the Royal Meteorological Society, that, as a general rule, there is more sunshine around the east, south and south west coasts of England than inland.

It may be hoped that the amount of sunshine enjoyed in this district will do something to redeem the character of Cornwall, and explain that though the clouds drop rain they have a silvery lining. I am led to make these remarks from the gloomy picture of the extreme south-west of England drawn by Mr. J. Knox Laughton, F.R.A.S., F.G.S. in his standard work on Physical Geography in its relation to the prevailing winds and currents, (2nd Edition, page 151) in which he says: "In Devon and Cornwall the rain in winter is almost incessant and does not very often stop in summer" The sunshine recorder replies to this rather sweeping assertion that the sentence might with equal truth be transposed and read thus.—"In Devon and "Cornwall the sunshine in summer is almost incessant and does "not very often stop in winter."

TABLE OF BRIGHT SUNSHINE AT FALMOUTH

DURING

1881, 1882, AND 1883.

	Number of hours of bright sunshine.			Greatest amount in one day.			Number of days on which bright sunshine occurred.		
	1881	1882	1883	1881	1882	1883	1881	1882	1883.
January …………	63	27·2	55·1	7·3	6·0	6·6	20	11	22
February …………	72	84·5	82·5	9·0	9·2	8·9	19	20	24
March …………	140	156·2	185·8	10·8	10·5	10·5	24	29	27
April …………	118	193·7	196·4	12·3	12·5	11·8	23	29	27
May …………	281	254·7	168·8	14·8	14·5	12·7	29	29	27
June …………	255	262·5	207.5	14·5	14·5	15·0	27	27	24
July …………	237	188·7	176.0	14·5	14·2	13·4	30	30	29
August …………	191	199·7	179·6	12·5	12·5	12·7	27	31	29
September …………	198	139·0	133.5	11·5	11·3	11·4	27	27	27
October …………	148	109·1	97·1	9·8	9·8	9·7	29	25	23
November …………	84	75·2	63·4	8·5	6·8	6·8	21	22	21
December…………	67	39.7	49·3	8·8	7.2	6·3	21	14	20
Sums …………	1847	1730·2	1615·0	134·3	129·0	125·8	297	293	300
Means …………	154	144·2	134·6	11·2	10·8	10·5	24·8	24·4	25

The next is a comparative table of the climate of Falmouth and Helston, (stations established at those respective places by the Polytechnic Society, the data from which appear regularly in the Meteorological Record, which is published quarterly by the Royal Meteorological Society with the returns from other stations and is in the same form as published by them).

STATION. 1883.		Means. at 9 a.m.		TEMPERATURE.								RAIN.	
				MEANS.				EXTREMES IN MONTH.			Mean amount of Cloud at 9 a.m.		
		Temperature	Humidity.	Min.	Max.	Range.	Means.	Min.	Max.	Range.		Amount.	No. of days.
		°		°	°	°	°	°	°	°			
Falmouth .	January :	46·3	86	42·5	49·8	7·3	46·2	35·5	55·0	19·5	7·8	4·95	22
Helston ...		45·8	88	41·3	51·7	10·4	46·5	33·9	56·1	22·2	7·8	4·01	24
Falmouth .	February .	45·4	88	40·3	50·0	9·7	45·1	32·8	55·3	22·5	6·4	7·23	18
Helston ...		45·4	88	40·0	51·7	11·7	45·9	32·5	55·2	22·7	7·6	5·79	20
Falmouth .	March	41 3	74	35·1	46·0	10·9	40·6	25·6	56·2	30·6	5·4	2·51	14
Helston ...		40·9	78	33·9	47·2	13·3	40·5	24·7	58·0	33·3	5·5	2·44	15
Falmouth .	April	49·8	74	41·9	53·4	11·5	47·6	34·4	59·1	24·7	5·7	1·21	9
Helston ...		49·1	77	40·5	54·5	14·0	47·5	34·5	61·2	26·7	5·8	1·41	11
Falmouth .	May	54·5	72	46·1	58·1	12·0	52·1	34·9	69·3	34·4	7·1	2·47	15
Helston ...		53·1	76	44·4	59·6	14·2	51·5	34·5	73·6	39·1	6·8	1·71	14
Falmouth .	June	58·8	79	51·5	63·9	12·4	57·7	46·3	73·1	26·8	6·9	2·51	19
Helston ...		57·9	83	50·7	63·5	12·8	57·1	43·0	72·2	29·2	6·8	2·03	18
Falmouth .	July	60·1	81	53·5	63·3	9·8	58·4	47·9	68·0	20·1	7·7	2·57	21
Helston ...		59.2	82	52·6	64·4	11·4	58·3	44·8	70·1	25·3	7·5	2·66	22
Falmouth .	August ...	61·7	79	54·7	65·5	10·8	60·1	49·4	73·6	24·2	7·1	1·40	15
Helston ...		60·6	82	53·9				48·2			7·6	1·24	15
Falmouth .	September	58·5	84	52·9	61·6	8·7	57·3	46·8	64·9	18·1	6·7	6·40	19
Helston ...		57·9	85	51·1	63·5	12·4	57·3	43·4	68·7	25·3	7·2	5.79	19
Falmouth .	October ...	54·3	83	49·2	57·1	7·9	53·1	41·3	60·1	18·8	7·1	4·26	16
Helston ...		53·8	84	48·0	58·9	10·9	53·4	38·4	63·4	25·0	7·0	3·29	24
Falmouth .	November	49·2	86	43·8	53·0	9·2	48·4	35·4	56·1	20·7	7.0	8·22	26
Helston ...		49·1	86	43·1	55·2	12·1	49·1	31·6	59·8	28·2	8·0	5·16	21
Falmouth .	December	45·2	84	42·0	48·6	6·6	45·3	30·7	53·8	23·1	7·5	1·80	22
Falmouth .	MEANS	52·1	81	46·1	55·9	9·7	51·0	38·4	62·0	23·6	6·9	3·79	18

THE RAINBAND IN THE SPECTRUM. Regular observations were commenced by me on the first of September last, and have been since continued daily at 9 a.m. local time. The scale which I have used has been

0 = none
1 = faint
2 = moderate
3 = strong
4 = very strong

I have not found it practicable to subdivide it more. Reckoning by this scale the sums of the daily rainband observations during the last four months of the year when compared with the rainfall were as follows:

1883	RAINBAND.	RAINFALL
		INCHES.
September	52	6·40
October	51	4·26
November	56	8 22
December	36	1·80

These figures would seem to establish a fairly satisfactory connection between the two; that the relation is not closer may be owing more to the inexperience of the observer than to a defect in the indications of the instrument. The difficulties in the way of its being used as a standard instrument and so becoming part of the regular equipment of meteorological stations which appear to me hardest to overcome are; —

(1) It is puzzling to say towards what exact point between the horizon and the zenith the spectroscope should be directed to get the true indication, as there is generally more or less band near the horizon which disappears towards the zenith.—

(2) It is equally puzzling to determine the point of the compass at which to look as there is frequently some band in one or more directions, whilst towards others there is little or none, and near the north as a rule it is wholly absent.

(3) If the instrument be not accurately focussed the readings are misleading.

(4) Rainband can always be seen, if the red end of the spectrum instead of being held as it should be to the left hand, is at the top or much inclined to the top.

(5) Different observers with varying powers of vision will naturally estimate the amount of rainband variously.

Notwithstanding these objections, I have found it very reliable as a weather prophet—more so as regards foretelling the probability or otherwise of rain than all the other instruments at my command. It should not be too hastily condemned because with certain weather there is a considerable rainfall with very little if any band. This occurs in our neighbourhood with cold squally north-westerly winds, accompanied with heavy showers and frequent intervals of bright sunshine, the former of which raise the rainfall although they cause little or no band. It is most useful in helping to form an estimate of the prospects of a day which opens with so dull and threatening an appearance as to make it seem to be the height of rashness to attempt to carry out any out-of-door arrangements which are dependent upon fine weather. When with these gloomy forebodings there is little or no band, a fine day may be expected and I have seldom known the prognostic to fail. It is in cases, where with a wholly overcast sky and apparent likelihood of wet, that the story told by the spectroscope through an absence of band gives confidence in predicting "no rain". A guide under such circumstances which seldom fails is "a friend in need and a friend indeed."

MISCELLANEOUS. Attention may be called to the very mild character of the month of January. The mean temperature from the Observatory readings was 46°0.—the mean of the daily maxima 49°3; of the daily minima 43°0. The absolute maximum was 54°1 and the absolute minimum was 36°2. These figures bear a striking contrast to the extraordinary cold which was experienced in the following March, being quite without precedent for that month so far as I can ascertain. The mean temperature was 39°9; the means of the daily maxima and minima were 44°6 and 35°7 respectively; the absolute maximum was 53°7 and the absolute minimum 26°8.

The extraordinary pressure of the air of 30·910 inches was recorded on the 23rd of February. This is the highest reading which has been made since the establishment of the Observatory with the exception of the wholly unprecedented pressures which occurred on the 18th of January and the 20th of February 1882 respectively.

On the 28th of June, a slight earthquake was felt at Falmouth about 1.45 p.m. in common with other parts of Cornwall and Devon.

November kept up its character as one of the wettest of months with 8·51 inches of rain, whilst December had the smallest rainfall for that month during the last 16 years viz. 1·86 inches, excepting December 1873, when it was 1·14 inches.

TABLE No. 1. WEST CORNWALL AND SCILLY ISLANDS, 1883.

Date.	PRESSURE OF AIR.						TEMPERATURE OF AIR.									WIND				HYGROMETRIC CONDTN							RAIN.	
1883.	Mean pressure of the atmosphere.	Maximum pressure observed.	Date of Maximum	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean temp. of the air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Mean monthly range	Relative proportion of N	E	S	W	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean diff. between Dew point and air.	Mean Humidity Comp. Satn. =100.	Mean weight of vapour in cubic ft. of air	Mean additional weight of vapour required to saturate cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	Number of Rainy Days.
	in.	in		in		in.	°	°	°	°	°		°							°	°	°		grs.	grs.	grs.		
Bodmin . .	29·968	30·870	2—24	28·500	9-2	·303	50·5				74·0	5-16 6- 4	21·0	3-24	27·2	81	55	104	125	47·9	45·3	5·8	82	3·4	0·72	543·9	51·98	236
Truro . . .	29·968	30·837	2—23	28·550	9-2	·309	50·6	58·2	41·0	14·2	78·0	5-16 6- 5	21·0	3-13	33·4	80	58	87	140	48.0	45·4	5·2	83	3·5	0·77	543·7	40·73	195
Falmouth	29·992	30·910	2—23	28·510	9-2	·306	50·6	54·9	46·7	8·2	71·6	8-26	26·8	3-10	20·4	87	46	90	142	47·9	45·1	5·5	82	3·5	0·79	544·2	47·80	238
Helston .																												*
Scilly . . .	29·960	30·860	2—23	28·570	9-2	·337	52·0	55·2	48·0	7·2	67·0	8-27	30·0	3-10	17·7	86	62	95	122	49·9	47·7	4·3	86	3·8	0·67	542·2	34·02	233
Means . .	29·972	30·869		28·532		·313	50·9	56·1	46·2	9·9	72·6		24·7		24·7	84	55	94	132	48·4	45·8	5·1	83	3·5	0·74	543·4	43·63	225

*No record from Scilly for 5 days during October.

TABLE No. 2.—FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″W.

DATE.	PRESSURE OF AIR.										TEMPERATURE OF AIR.									Temperature of the Sea.
1883.	Mean pressure of the atmosphere.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Maximum pressure recorded	Date of Max.	Minimum pressure recorded.	Date of Min.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Absolute Max.	Absolute Minimum.	Date of Absolute Min.	Monthly range	
	In.	In.	In.	In.	In.		In.		In.	In.	°	°	°	°	°		°		°	°
Jan.	29·666	30·006	29·724	·282	30·530	23	29·036	13	1·494	·263	46·0	49·3	43·0	6·3	54·1	1	36·2	26	17·9	48·9
Feb.	30·052	30·180	29·912	·268	30·910	23	28·680	2	2·230	·257	45·3	49·4	41·8	7·6	53·7	28	35·4	1	18·3	48·4
Mar.	29·997	30·073	29·844	·229	30·673	5	29·260	30	1·413	·179	39·9	44·6	35·7	8·9	53·7	5	26·8	10	26·9	46·6
April	29·995	30·084	29·903	·181	30·616	7	29·114	27	1·502	·249	47·2	51·9	42·7	9·2	56·6	11	35·1	24	21·5	48·3
May	29·982	30·045	29·916	·129	30·388	17	29·487	9	0·901	·306	51·8	56·5	46·9	9·6	66·5	23	37·0	6	29·5	52·0
June	29.986	30·043	29·959	·084	30·459	13	29·680	28	0·779	·371	57·1	62·2	52·4	9·8	69·2	13	47·7	17	21·5	56·7
July	29·909	29·984	29·832	·152	30·300	16	29·509	12	0·791	·394	58·3	63·0	54·2	8·8	67·8	28	50·7	21	17·1	56·0
Aug.	30·082	30·146	30·017	·129	30·340	23	29·681	31	0·659	·415	59.5	64·9	54·9	10·0	71·6	26	50·7	19	20·9	57·7
Sept.	29·868	29·976	29·727	·249	30·271	11	28·510	2	1·761	·407	56·7	60·5	53·2	7·3	64·1	21	48·0	9	16·1	57·2
Oct.	30·025	30·123	29·919	·204	30·551	8	29·328	16	1·223	·325	52·4	56·1	49·4	6·7	59·0	{9 25	43·0	30	16·0	56·4
Nov.	29·881	30·011	29·748	·263	30·343	30	28·946	25	1·397	·277	48·2	52·1	44·4	7·7	55·4	{4 30	38·0	15	17·4	
Dec.	30·266	30·366	30·151	·215	30·672	7	29.691	11	0·981	·241	44·8	48·1	42·0	6·1	53·0	13	31·5	7	21.5	
Means	29·992	30·086	29.888	·198	30·504		29·243		1·261	·306	50·6	54·9	46·7	8·2	60·4		40·0		20·4	52·8

N.B.—The Instruments at Falmouth belong to the Meteorological Council, with whose permission the results are published.

TABLE No. 3.—FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″ W.

DATE	WIND.										HYGROMETRICAL CONDITION.									DATE.
1883.	Relative porportion of				Mean velocity in miles per hour.	Max. velocity during one hour.	Day and hour of Max. velocity.	Direction of Max. velocity.	Mean pressure in lbs. per sqr. foot.	Maximum pressure.	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean difference between dew point & air.	Mean Humidity. Complete saturation=100.	Mean weight of vapour in a Cubic foot of air.	Mean weight vapour required to saturate a Cubic foot of air.	Mean weight of a Cubic foot of air.	RAIN.	No. of Rainy days.	1883.
	N	E	S	W																
					miles.	miles.			lbs.	lbs.	°	°	°		gr.	gr.	gr.	in.		
Jan.	2	7	12	10	22·7	52	10th, 6 p.m.	ESE	2·5	13·5	43·9	41·5	4·5	85	3·07	0·53	547·1	5·345	25	Jan.
Feb.	3	3	11	11	18·7	62	28th, 11p.m.	SW by S	1·7	19·2	43·3	41·0	4·3	85	2·93	0·53	551·1	7·580	19	Feb.
Mar.	15	6	1	9	13·1	53	12th, 5 a.m.	S by E	1·8	14·0	36·3	31·7	8·2	73	2·07	0·82	556·6	2·615	14	Mar.
April	6	7	8	9	14·5	44	23rd, 1 a.m.	ENE	1·0	9·7	43·9	40·2	7·0	84	2·86	0·86	548·1	1·305	11	April
May	8	5	8	10	13·3	38	26th, mid.	ESE	·88	7·2	48·7	45·6	6·2	79	3·46	0·90	542·6	2·275	17	May
June	7	4	7	12	14·0	36	12th, 7 p.m.	SSW	·98	6·5	53·8	50·8	6·3	80	4·13	1·09	536·8	2·965	20	June
July	10	0	6	15	14·9	39	27th, 3 p.m.	S by W	1·1	7·6	55·2	52·4	5·9	81	4·40	1·06	533·9	2·805	25	July
Aug.	8	1	7	15	12·9	39	11th, 2 p.m.	SW by S	.64	7·6	56·5	53·8	5·7	83	4·55	1·05	535·5	1·515	18	Aug.
Sept.	7	4	8	11	17·3	53	14th, 1 p.m	NW	1·5	14·0	54·9	53·3	3·4	88	4·53	0·61	534·8	6·390	21	Sept.
Oct.	6	5	9	11	16·7	50	1st, 3 p.m.	SSE	1·4	12·5	49·8	47·2	5·2	83	3·70	0·75	542·7	4·620	20	Oct.
Nov.	4	2	8	16	17·5	42	15th, 5 p.m.	S	1·5	8.8	45·7	43·0	5·2	83	3·19	0·65	545·9	8·515	24	Nov.
Dec.	11	2	5	13	16·5	47	5th, 9 p.m.	SW	1·4	11·0	42·3	39·4	5·4	81	2·78	0·80	555·8	1·860	24	Dec.
							3rd, 9 p.m.	WNW												
Means	87	46	90	142	16·5	46·3			1·4	10·7	47·9	45·0	5·6	82	3·47	0·79	544·2	47·800	238	means.

TABLE No. 4—BODMIN. Latitude 50° 28′ 30″ N., Longitude, 4° 42′ 20″ W. Meteorological Register Kept by COMMANDER J. LIDDELL, R.N.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.											RAIN.						REMARKS.
1883.	MEAN PRESSURE.	MAXIMUM PRESSURE OBSERVED.	Date.	MINIMUM Pressure observed	Date.	MEAN TEMPERATURE.	ABSOLUTE MAXIMUM.	Date.	ABSOLUTE MINIMUM.	Date.	MINIMUM on grass.	Date.	Mean temperature of 34 years.	Max. diff. between wet & dry bulbs.	Date.	mean difference of wet & dry bulbs.	Days with rain.	Mean no. of rainy days in 34 years.	Greatest rainfall.	Date	Monthly rainfall.	Monthly rainfall, mean of 34 years	
	ins.	ins.		ins.		deg	deg		deg		deg		deg	deg		deg			ins.		ins.	ins.	
Jan.	29·94	30·50	6	29·09	13	43·1	56	17	32	27	27	16	42·1	5	2	1·7	25	22·4	0·83	10	5·34	5·29	Very mild and rainy month.
Feb.	30·06	30·87	24	29·27	12	43·9	50	24	27	1	26	1	43·1	4	23	1·6	22	18·5	2.02	1	9·48	3·76	The heaviest rainfall ever known in February.
March	29·91	30·63	4	29·29	30	37·7	53	5	21	24	12	24	44·4	5	7	2·2	15	18·8	0·58	29	1·89	3·31	The coldest March recorded.
April.	29·98	30·57	7	29·18	27	48·9	58	14	31	1	22	10	50·6	7	7	3·3	13	14·8	0·59	26	2·27	2·95	
May.	30·00	30·39	17	29·50	9	56·8	74	16	32	6	24	6	·7	8	14	4·1	14	13·8	0·69	11	2·66	2·79	A very genial month.
June.	29·97	30·42	13	29·74	5	61·3	74	4	42	21	40	16	59·4	9	3	3·3	19	14·8	0·88	27	4·33	3·08	
July.	29·89	30·26	16	29·58	12	59·3	69	30	47	16	44	15	62·6	5	16	2·0	21	16·6	0·72	13	5·19	3·24	A wet and cold month.
Aug.	30·05	30·31	23	29·73	14	60·9	72	21	48	12	42	25	62·5	7	14	3·	21	16·9	0·29	14	1·50	3·74	
Sept.	29·88	30·26	13	28·50	2	56·7	70	19	42	9	32	9	59·0	5	8	3·4	21	17·0	1·80	23	7·22	4·11	Very heavy rainfalls.
Oct.	30·03	30·49	8	29·35	16	50·7	60	9	35	21	28	21	58·1	5	6	2·0	20	20·6	1·07	13	4·59	5·74	
Nov.	29·81	30·27	27	29·05	25	45·3	56	28	33	14	27	14	46·0	4	25	2·3	23	20·7	0.72	15	5.90	5·41	
Dec.	30·21	30·62	7	29·82	15	41·8	52	14	28	7	24	7	42·8	6	4	2·1	22	20·1	0·37	10	1·61	5·37	The smallest rainfall ever recorded in December, highest mean barometer, and the least wind.
	29·968	30·466		29·337		50·5	62·0		34·8		29·0		51·8	5.8		2·6	236	215·0	0·85		51·98	48·79	

REMARKS—Height of RAIN GAUGE above the sea. 315 feet, and above the ground one foot. Diameter of Gauge (Cassella's) 5 inches. Barometer reduced to sea-level and 32° of temperature. Thermometers are hung four-and-half feet above the ground (sheltered) and facing north.

The means are those of 34 years. The greatest rainfall 71·93 inches in 1872; the least, 33.15 inches in 1854. The greatest Barometric pressure, 30.95 inches on the 18th of January 1882: the least 28.06 inches on the 23rd of January, 1873, at 3 a.m.

WINDS.

North	34	East	32	N. East	19	S. East	36
South	48	West	41	N. West	75	S. West	80

TABLE No. 5. TRURO. Latitude, 50° 17′ N.; Longitude, 5 4′ 5″ W. From Registers kept at the Royal Institution of Cornwall.

DATE.	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND				HYGROMETRIC CONDITION.								
1883.	Mean pressure of atmosphere.	Maximum pressure observed.	Date of Maximum.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean of Dry bulb.	Mean of daily maxima.	Mean of daily minima.	Mean temperature	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	Mean temperature of evaporation.	Mean temperature of dew point.	Mean diff. between dew point and air.	humidity, plete satrtn.=100.	Mean weight of vapour in cubic foot of air.	Mean additional weight of vapour required to saturate cubic ft. of air	Mean weight of cubic foot of air.	RAIN.	No. of Rainy days.
	in.	in.		in.		in'	°	°	°	°	°	°		°	°	°					°	°	°		grs.	grs.	grs.	in.	
Jan.	29·850	30·497	23	29·080	18	·262	46·2	51·0	40·5	45·6	10·5	56	18	28	16	28	2	8	10	11	44·0	41·5	4·7	85	3·1	0·6	546·3	3·86	19
Feb.	30·049	30·837	23	28·740	2	·262	45·4	52·0	38·5	45·1	13·5	56	14	27	13	29	4	2	9	13	43·6	41·5	3·9	87	3·0	0·5	551·0	6·79	18
March	29·956	30·650	5	29·300	30	·200	40·1	47·7	32·1	39·7	15·6	57	5	21	13	36	14	7	2	8	37·7	34·6	5·5	81	2·3	0·6	555·7	2·56	13
April	29·987	30·596	7	29·110	27	·253	47·7	56·5	37·3	46·8	19·2	65	12	28	1	37	5	9	8	8	44·3	40·6	7·1	77	2·9	0·8	548·2	1·66	13
May	29·975	30·374	17	29·492	9	·303	52·0	60·7	43·0	51·0	17·7	78	16	28	6	50	7	5	8	11	48·7	45·3	6·7	78	3·4	1·0	542·4	1·86	12
June	29·944	30·451	13	29·717	27	·370	56·1	66·5	49·5	57·7	17·0	78	5	40	21	38	6	4	7	13	53·3	50·7	5·4	82	4·2	1·0	537·2	2·82	16
July	29·896	30·289	16	29·491	12	·393	57·4	66·5	53·2	59·5	13·3	71	28	48	15	23	8	1	8	14	54·7	52·3	5·1	83	4·4	0·9	534·6	2·78	18
Aug.	30·055	30·311	23	29·671	8	·410	59·7	69·7	52·8	60·9	16·9	77	26	40	19	37	6	2	8	15	56·4	53·5	6·2	81	4·6	1·2	534·9	1·11	11
Sep.	29·841	30·240	12	28·550	2	·396	56·9	64·6	52·0	58·1	12·6	71	19	44	12	27	5	4	9	12	54·6	52·5	4·4	86	4·4	0·9	534·0	5·73	18
Oct.	29·953	30·503	8	29·363	16	·333	53·0	58·9	47·5	52·7	11·3	65	10	31	21	34	7	7	7	10	50·4	47·8	5·2	82	3·7	0·8	540·5	3·67	16
Nov.	29·848	30·300	28	28·994	25	·280	47·9	54·2	41·9	47·9	12·3	59	28	26	15	32	6	4	7	13	45·7	43·3	4·6	86	3·2	0·6	544·5	6·15	24
Dec.	30·243	30·659	7	29·779	15	·254	44·8	49·8	40·2	45·0	9·6	55	14	26	8	29	10	5	4	12	42·9	40·7	4·1	86	2·9	0·5	555·3	1·74	18
Means	29·968	30·475		29·274		·309	50·6	58·2	44·0	50·8	14·2	65·6		32·2		33·4	80	58	87	140	48·0	45·4	5·2	83	3·5	0·77	543·7	40·73	195

REMARKS.—The Barometer is a Standard by Barrow, and has been compared by Mr. Glaisher with the Standard at Greenwich. The Cistern is 48 feet above mean sea level. All the Barometic readings have been corrected for Index Error and Capillarity, and reduced to 32 degrees Fahr. at sea level. The Thermometers and Rain Gauge are placed on the roof of the Royal Institution at Truro, about 40 feet above the ground, the former being in a wooden shed through which the air passes freely. The Standard dry and wet bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher. Corrections for Diurnal Range have been applied where necessary.

TABLE No. 4—BODMIN. Latitude 50° 28′ 30″ N., Longitude, 4° 42′ 20″ W. Meteorological Register

Kept by Commander J. LIDDELL, R.N.

Date.	Pressure of Air.					Temperature of Air.											Rain.						Remarks.
1888.	Mean pressure.	Maximum pressure observed.	Date.	Minimum pressure observed	Date.	Mean temperature.	Absolute maximum.	Date.	Absolute minimum.	Date.	Minimum on grass.	Date.	Mean temperature of 34 years.	Max. diff. between wet & dry bulbs.	Date.	mean differences of wet & dry bulbs.	Days with rain.	Mean No. of rainy days in 34 years.	Greatest rainfall.	Date	Monthly rainfall.	Monthly rainfall, mean of 34 years	
	ins.	ins.		ins.		deg	deg		deg		deg		deg	deg		deg			ins.		ins.	ins.	
Jan.	29·94	30·50	6	29·09	13	43·1	56	17	32	27	27	16	42·1	5	8	1·7	25	22·4	0·83	10	5·34	5·29	Very mild and rainy month.
Feb. .	30·06	30·87	24	29·27	12	43·9	50	24	27	1	25	1	43·1	4	23	1·6	22	18·5	2.02	1	9·48	3·76	Theheaviest rainfall ever known in February.
March	29·91	30·68	4	29·29	30	37·7	53	5	21	24	12	24	44·4	5	7	2·2	15	18·8	0·58	29	1·89	3·31	The coldest March recorded.
April.	29·98	30·57	7	29·13	27	48·9	58	14	31	1	22	10	50·6	7	7	3·5	13	14·8	0·59	26	2·27	2·95	
May .	30·00	30·39	17	29·50	9	56·8	74	16	32	6	24	6	·7	8	14	4·1	14	13·8	0·69	11	2·65	2·79	A very genial month.
June .	29·97	30·42	13	29·74	5	61·3	74	4	42	21	40	16	59·4	9	3	3·3	19	14·8	0·88	27	4·33	3·08	
July .	29·89	30·26	15	29·58	12	59·3	69	30	47	16	44	15	62·6	5	16	2·0	21	16·6	0·72	13	5·19	3·24	A wet and cold month.
Aug. .	30·05	30·31	23	29·73	14	60·9	72	21	48	12	42	25	62·5	7	14	3·	21	16·9	0·29	14	1·50	3·74	
Sept. .	29·88	30·26	13	28·50	3	56·7	70	18	42	9	32	9	59·0	5	3	3·4	21	17·0	1·80	23	7·22	4·11	Very heavy rainfalls.
Oct. .	30·08	30·49	8	29·35	16	50·7	60	9	35	21	28	21	58·1	5	6	2·0	30	20·6	1·07	13	4·59	5·74	
Nov. .	29·81	30·27	27	29·05	25	45·3	56	28	33	14	27	14	46·0	4	25	2·3	23	20·7	0.72	15	5.90	5·41	
Dec. .	30·21	30·62	7	29·82	15	41·8	52	14	28	7	24	7	42·8	6	4	2·1	22	20·1	0·37	10	1·61	5·37	The smallest rainfall ever recorded in December, highest mean barometer, and the least wind.
	29·968	30·466		29·337		50·5	62·0		34·8		29·0		51·8	5.8		2·6	236	215·0	0·85		51·96	48·79	

REMARKS—Height of Rain Gauge above the sea. 315 feet, and above the ground one foot. Diameter of Gauge (Cassella's) 5 inches. Barometer reduced to sea-level and 32° of temperature. Thermometers are hung four-and-half feet above the ground (sheltered) and facing north.

The means are those of 34 years. The greatest rainfall 71·93 inches in 1872; the least, 33.15 inches in 1854. The greatest Barometric pressure, 30.95 inches on the 18th of January 1882: the least 28.06 inches on the 23rd of January, 1873, at 3 a.m.

WINDS.

North.........	34	East.........	32	N. East	19	S. East......	36
South.........	48	West	41	N. West	75	S. West ...	60

TABLE No. 5. TRURO. Latitude, 50° 17′ N.; Longitude, 5 4′ 5″ W. From Registers kept at the Royal Institution of Cornwall.

DATE.	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND				HYGROMETRIC CONDITION.								
																	Relative proportion of												
1883.	Mean pressure of atmosphere.	Maximum pressure observed.	Date of Maximum.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean of Dry bulb.	Mean of daily maxima.	Mean of daily minima.	Mean temperature	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	N	E	S	W	Mean temperature of evaporation.	Mean temperature of dew point.	Mean diff. between dew point and air.	humidity, plete satrtn.=100.	Mean weight of vapour in cubic foot of air.	Mean additional weight of vapour required to saturate cubic ft. of air	Mean weight of cubic foot of air.	RAIN.	No. of Rainy days.
	in.	in.		in.		in.	°	°	°	°	°	°		°	°	°					°	°	°		grs.	grs.	grs.	in.	
Jan.	29·850	30·497	23	29·080	13	·262	46·2	51·0	40·5	45·6	10·5	56	18	28	16	28	2	8	10	11	44·0	41·5	4·7	85	3·1	0·6	546·3	3·36	19
Feb.	30·049	30·837	23	28·740	2	·262	45·4	52·0	38·5	45·1	13·5	56	14	27	13	29	4	2	9	13	43·6	41·5	3·9	87	3·0	0·5	551·0	6·79	18
March	29·956	30·650	5	29·300	30	·200	40·1	47·7	32·1	39·7	15·6	57	5	21	13	36	14	7	2	8	37·7	34·6	5·5	81	2·3	0·6	555·7	2·56	13
April	29·987	30·596	7	29·110	27	·253	47·7	56·5	37·3	46·8	19·2	65	12	28	1	37	5	9	8	8	44·3	40·6	7·1	77	3·9	0·8	548·2	1·66	13
May	29·975	30·374	17	29·492	9	·303	52·0	60·7	43·0	51·0	17·7	78	16	28	6	50	7	5	8	11	48·7	45·3	6·7	78	3·4	1·0	542·4	1·86	12
June	29·964	30·451	13	29·717	27	·370	56·1	66·5	49·5	57·7	17·0	78	5	40	21	38	6	4	7	13	53·3	50·7	5·4	82	4·2	1·0	537·2	2·82	16
July	29·896	30·289	16	29·491	12	·393	57·4	66·5	53·2	59·5	13·3	71	28	48	15	23	8	1	8	14	54·7	52·3	5·1	83	4·4	0·9	534·6	2·78	18
Aug.	30·055	30·311	23	29·671	8	·410	59·7	69·7	52·8	60·9	16·9	77	26	40	19	37	6	2	8	15	56·4	53·5	6·2	81	4·6	1·2	534·9	1·11	11
Sep.	29·841	30·240	12	28·550	2	·396	56·9	64·6	52·0	58·1	12·6	71	19	44	12	27	5	4	9	12	54·6	52·5	4·4	86	4·4	0·9	534·0	5·73	18
Oct.	29·953	30·503	8	29·363	16	·333	53·0	58·9	47·5	52·7	11·3	65	10	31	21	34	7	7	7	10	50·4	47·8	5·2	82	3·7	0·8	540·5	3·67	16
Nov.	29·848	30·300	28	28·994	25	·290	47·9	54·2	41·9	47·9	12·3	59	28	26	15	32	6	4	7	18	45·7	43·3	4·6	86	3·2	0·6	544·5	6·15	24
Dec.	30·243	30·659	7	29·779	15	·254	44·8	49·8	40·2	45·0	9·6	55	14	26	8	29	10	5	4	12	42·9	40·7	4·1	86	2·9	0·5	555·3	1·74	18
Means	29·968	30·475		29·274		·319	50·6	58·2	44·0	50·8	14·2	65·6		32·2		33·4	80	58	87	140	48·0	45·4	5·2	83	3·5	0·77	543·7	40·73	195

Remarks.—The Barometer is a Standard by Barrow, and has been compared by Mr. Glaisher with the Standard at Greenwich. The Cistern is 48 feet above mean sea level. All the Barometic readings have been corrected for Index Error and Capillarity, and reduced to 32 degrees Fahr. at sea level. The Thermometers and Rain Gauge are placed on the roof of the Royal Institution at Truro, about 40 feet above the ground, the former being in a wooden shed through which the air passes freely. The Standard dry and wet bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher. Corrections for Diurnal Range have been applied where necessary.

TABLE No. 6.—HELSTON. *Lat.* 50° 6′ *N.*, *Long.* 5° 15′ *W.*, *for the year* 1883.

From Registers kept by Mr. John Gill.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.													WIND.					HYGROMETRIC CONDITION.					RAIN.		
1883.	Mean pressure of atmosphere.	Maximum pressure observed.	Date.	Minimum pressure observed	Date.	Readings at 9 a.m dry	Readings at 9 a.m wet	Readings at 9 p.m. dry	Readings at 9 p.m. wet	Corrected mean of Dry Bulb.	Mean of daily maxima.	Mean of daily minima.	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	CALM.	Mean temperature of Evaporation.	Mean temperature of the dew point.	Mean humidity, complete saturation-100	Mean weight of vapour in a cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	No. of rainy days.	Mean degree of cloudiness—9 a.m.
	In.	In.		In.		o	o	o	o	o	o	o	o	o		o		o						o	o		Grs.	Grs.			
Jan.						45·8	44·2	45·6	43·6	45·7	51·5	40·6	10·9	56·3	30	32·8	27	23·5	2	8	11	9	1	43·9	41·9	87	3·01		4·115	24	8·0
Feb.						45·5	43·9	45·1	43·4	45·3	51·2	39·5	11·7	64·8	14	31·4	1	23·4	3	2	7	10	6	43·6	41·7	87	2·99		5·783	20	7·6
March	29·982	30·674	5	29·330	30	41·1	38·1	38·2	36·5	39·6	47·0	32·9	14·1	59·0	5	24·7	10	33·3	11	9	1	4	6	37·3	34·1	81	2·30	556·4	2·445	17	5·4
April	29·978	30·596	7	29·123	2	49·0	45·7	44·9	43·3	46·9	54·5	40·6	13·9	61·2	9	34·5	24	26·7	6	8	5	4	6	44·3	41·8	83	3·02	548·1	1·405	11	6·0
May	29·997	30·381	17	29·533	9	53·1	49·5	49·1	47·7	51·1	58·4	44·5	13·9	73·6	16	34·5	6	39·1	7	6	6	6	6	48·6	46·0	83	3·51	543·6	1·710	15	7·0
June	29.985	30·448	13	29·752	27	57·9	55·1	53·7	50·8	55·8	63·5	51·8	11·7	72·2	5	43·0	21	29·2	7	4	8	5	6	52·9	50·2	82	4·09	538·0	2·030	21	7·0
July	29·923	30·311	16	29·582	12	59·9	56·3	55·1	54·0	57·5	64·0	52·6	11·4	70·1	28	44·8	15	25·3	10	0	11	7	3	55·1	52·9	85	4·43	534·8	2·660	24	8·0
Aug.	30·068	30·829	23	29·712	31	60·7	57·6	56.2	54·9	58·4		52·7				48·2	19	19·5	6	3	5	12	5	56·2	54·2	86	4·68	536.5	1·235	16	7·0
Sep.	29·890	30·280	11	28·500	2	57·9	55·4	55·0	53·4	56·4	63·5	51·2	12·3	69·0	12	44·4	9	24·6	9	2	7	10	2	54·4	52·5	88	4·44	535·2	5·785	21	7·0
Oct.	30·041	30·641	7	29·414	15	53·8	51.5	51·3	49·8	52·5	58·9	48·0	10·9	63·4	9	38·4	20	25·0	10	4	4	9	4	50·6	48·7	87	3·88	542·7	3·290	17	7·0
Nov.	29·817	30·224	28	28·900	26	49·1	47·1	48·6	46·6	43·8	55·2	43·1	12·1	59·8	19	31·6	14	28·2	5	2	5	12	6	46·8	44·7	86	3·30	543·0	5·160	23	8·0
Dec.																													1·985	20	
Means.	29·963	30·421		29·316		52·2	49·5	49·3	47·6	50·7	56·8	46·2	12·3	63·8		37·1		27·0	76	48	71	88	51	48.5	46·2	85	3·61	542·0	36·705	229	7·1

The Thermometers are by Casella. They are placed in a Stephenson Screen facing North, and have been verified at Kew Observatory. The Rain Gauge (also by Casella), has a diameter of 8 inches. The Instruments at this Station are the property of the Royal Cornwall Polytechnic Society—with the exception of Max. and Min. Thermometers, which belong to Mr. Gill.

TABLE No. 7.—SCILLY ISLANDS. Lat. 49° 55′ N.; Long 6° 19′ W.

From Observations taken by Mr. William Thomas.

DATE	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND				HYGROMETRIC CONDITION.								
1883.	Mean pressure of the atmosphere.	Maximum pressure observed.	Date of Max.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean of Dry bulb.	Mean of daily maxima.	Mean of daily minima.	Mean temperature.	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	Mean temp. of evaporation.	Mean temperature of dew point.	Mean diff. between dew point and air.	Mean humidity, complete satrtn.=100.	Mean weight of vapour in cubic foot of air.	Meanadditional weight of vapour required to saturateCubic ft of air.	Mean weight of a Cubic foot of air.	RAIN.	No. of Rainy days.
	in.	in.		in.		in.	°	°	°	°	°	°		°		°					°	°	°		grs.	grs.	grs.	in.	
Jan.	29·815	30·430	6	28·960	13	·307	48·2	51.1	44·4	47·8	6·7	55·0	18 21	36·0	27	19·0	2	7	13	9	47·0	45·7	2·5	92	3·46	0·36	543·4	3·53	22
Feb.	29·992	30·860	23	28·690	2	·280	46·7	50·2	42·4	46·3	7·8	53·0	7 15	36·0	3	17·0	2	2	11	13	45·1	43·3	3·4	89	3·18	0·48	550·2	5·13	21
March	29·936	30·650	5	29·250	30	·226	42·5	46·1	38·0	42·1	8·1	51·0	oft	30·0	9 10	21·0	13	10	2	6	40·3	37·7	4·8	84	2·61	0·54	552·4	1·68	20
April	29·960	30·540	7	29.000	27	·274	48·9	52·4	43·8	48·1	8·6	56·0	Thr	37·0	24	19·0	6	9	9	6	45·9	42·7	6·2	80	3·18	0·80	546·5	1·72	11
May	29·950	30·330	18	29·490	7 9	·327	52·3	55·8	47·7	51·8	8·1	63·0	31	38·0	4	25·0	8	7	7	9	49·8	47·3	5·0	84	3·71	0·75	541·5	1·64	14
June	29·960	30·450	13	29·680	8	·385	57·0	60·6	52·6	56·6	8·0	65·0	4	48·0	16	17·0	8	5	6	11	54·3	51·8	5·2	83	4·29	0·91	536·2	3·21	21
July	29·883	30·260	17	29·530	12	·424	58·4	61·8	54·4	58·1	7·4	65·0	oft	50·0	15	15·0	7	0	8	16	56·3	54·4	4·0	87	4·71	0·77	533·0	3·96	26
Aug.	30·059	30·310	23	29·680	14	·443	59·7	63·6	55·7	59·7	7·9	67·0	27	53·0	3	14·0	8	3	8	12	57·5	55·6	4·1	87	4·91	0·83	534·8	0·84	18
Sep.	29·837	30·260	12	28·570	2	·410	57·3	60·3	54·0	57·2	6·3	65·0	26	48·0	29	17·0	8	4	8	10	55·3	53·5	3·8	87	4·56	0·70	533·5	4·91	19
Oct.	30·018	30·550	8	29·360	16	·378	54·7	57·3	51·0	54·2	6·3	61·0	10	46·0	20	15·0	7	7	10	7	53·0	51·3	3·4	88	4·26	0.58	539·7	1·75	16
Nov.	29·853	30.230	30	29·030	25	·313	50·9	53·4	47·3	50·4	6·1	56·0	Thr	42·0	10	14·0	7	2	8	13	48·6	46·2	4·7	85	3·59	0·60	541·1	3·90	24
Dec.	30·254	30·550	7	29·840	14	·272	47·8	49·9	44·4	47·2	5·5	55·0	1 28	35·0	7	20·0	10	6	5	10	45·3	42·5	5·3	93	3·10	0·68	552·1	1·75	21
Means	29·960	30.452		29·256		·337	52·0	55·2	48·0	51·6	7·2	59·3		41·6		17·7	86	62	95	122	49·9	47·7	4·3	86	3·80	0.67	542·0	34·02	233

EXPLANATION OF DIAGRAM.

(*On Opposite Page.*)

The curves shown in the accompanying diagram are based on observations taken at the Meteorological Observatory at Falmouth, with instruments belonging to the Meteorological Council.

It will be observed that the Diagram is divided vertically into months, weeks and days; the months being separated by thick lines, the weeks by thinner lines, and the days by the finest lines. Opposite every Sunday the day of the month is inserted at the upper part of the Diagram. Thus the day of the month and the day of the week may be readily ascertained.

In the upper part of the Diagram the Velocity of the Wind is shown; the spaces between the finest horizontal lines representing two miles per hour. The velocity indicated by the curve is the average of the whole of the 24 hours from midnight to midnight; and this velocity is shown by the height of the curve midway between the fine lines dividing the days.

Below the curve of velocity the prevailing Direction of the Wind during the day from midnight to midnight is inserted.

In the lower part of the Diagram is a curve of Baromectical Pressure drawn on a natural scale, and representing the average height of the Barometer for the 24 hours composing every day; the height of the curve midway between the fine lines dividing the days indicating the average pressure. In all cases the Barometic Readings have been reduced to 32° at mean sea level.

Below this curve, the mean temperature of the day is given in degrees Fahrenheit.

1883.

CATALOGUE

OF THE

FIFTY-FIRST

ANNUAL

EXHIBITION

OF THE

Royal Cornwall Polytechnic Society,

AT THE

POLYTECHNIC HALL, FALMOUTH,

And at No. 10 Shed, FALMOUTH DOCKS,

FROM

September 11th to September 15th.

FALMOUTH:
PRINTED BY FRED. H. EARLE, QUAY
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Art Union of Cornwall.

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25	Model Beam Engine	ditto	
26	Hydraulic Ram with automatic attachment for ditto	ditto	
27	Angle and Depth Meter	ditto	
28	Patent Curve Meter	ditto	
29	Centre Punch	ditto	
30	Model of a Doll's House	Wm. Neame	
31	Compound Microscope	James Bickle	*Second Bronze Medal for Workmanship*
32	Dissecting ditto	ditto	
33	Bull's-eye Condenser	ditto	
34	Model of Marine Engine	Joseph Jobson	*Prize £1*
35	Well's Oil Feeders and Lamps	R. W. Tayler	*Second Bronze Medal*
36	Electric Bell, with battery complete	H. E. Chappel	*Highly Commended*
37	'Fire Queen'	James Sinclair	*Highly Commended*
38	ditto	ditto	
39	Tyndall's Smoke Respirator for Firemen	ditto	
40	Instantaneous Hose Coupling	ditto	*First Bronze Medal*
41	Patent Union	ditto	
42	Umbrella Tent, with walls Warnerized to prevent moths and mildew, and also water repellent	ditto	

43 Weather Line ... ... James Sinclair } *First*
44 Tennis Nets ... ... ditto } *Bronze*
45 Chinese Hammock and sundry materials } *Medal*
Warnerized by new process ditto
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47 Harness Snaps ditto } *Medal*
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Second Bronze Medal
54 Universal Cutter ... ... ditto
55 Dead-beat Sectioner, spiral adjustment, James P. Maginnis
Second Silver Medal
56 ditto taper adjustment ditto
57 Universal Sector ... ... ditto
Highly Commended
58 Adjustable Parallel Ruler ... ... ditto
62 Model of Skip Improvement and Skip Road, as used at Pednandrea ... ... James Thomas
Second Silver Medal
63 Model of Mining Skip and Cage, fitted with patent spring catch ... ... William Bennetts
64 Gas Grillers or Cooking Stoves ... ... Cox & Beynon
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70 Improved Cornice Mould ... ... B. King
71 Canvas Valves ... ... J. Mayne
First Bronze Medal
72 Indiarubber ditto ... ... ditto
73 Model of Patent Piston Rings ... Sara and Burgess
74 Drawing for Hydraulic Engine, R. Trevithick, made in 1803, contributed by S. Bennetts
75 Models of the five Cubic Cones of the 3rd class, H. M. Jeffery

76	Model of Snow Gate	John Bennetts	
77	Sewing Machines	Singer Company	
78	Model of Safety Skip	William Bosisto	
79	Cheylesmore Tricycle ...	Coventry Machinist Co.	
80	Special Club Bicycle ...	ditto	
81	Gentleman's ditto ...	ditto	
82	Special Express Bicycle	J. Devey & Son	
83	Rudge's patent Convertible Tricycle		*79 to 83, Honorable Mention.*
84	Model of Newcomin Pumping Engine ...	F. W. Michell	*£1 to J. Bowden, for Workmanship*
85	Cage with Safety Catch	M. Tregoning	
86	Drawing of Safety Brake for Skips and Lifts ...	E. H. Clark	
87	Model of improved Pulveriser ..	W. Teague, Jr.	

EXHIBITED IN NO. 10 SHED

FALMOUTH DOCKS.

100	Portable Railway with four waggons and two Turntables	Bolling and Lowe	*Highly Commended*
101	Patent Hydraulic Car for driving tunnels in adit levels, &c.	Hathorn and Co.	*Second Silver Medal*
102	Patent "Eclipse" Rock Drill	ditto	*First Silver Medal for contest*
103	Barrow Rock Drill and Jumper	Barrow Rock Drill and Engineering Company	
104	The Stephens Rock Drill ...	Richard Stephens	
105	Excelsior Patent Rock Drill ...	Geo. F. Wynne	*First Bronze Medal for novelty of principle*
106	Cornish Rock Drill	Holman Bros.	
107	Patent Acme Fresh Water Distilling Apparatus	A. B. Fraser and Co.	*First Silver Medal*
108	Small Brass Model explanatory of above	ditto	
109	Engine-room Skylight ventilator, arranged to form water-tight bulkhead around engine room	Thomas Utley	
110	Stoke Hole ditto	ditto	*Second Silver Medal for Ship Ventilation*
111	20-inch Deck Ventilator ...	ditto	
112	Full-size Port-hole ditto ...	ditto	

113 Deck plan of Vessels for passenger boat and engine room ventilators ... ... Thomas Utley
114 Drawings of various Ventilators ... ditto
115 Ditto and plans for house ventilation ditto
116 Examples of Boyle's patent Ventilators R. Boyle and Son
First Bronze Medal
117 Ditto of Lamb's ditto J. M. Lamb and Co.
First Bronze Medal
118 Michell and Tregonning's patent Pulveriser F. W. Michell
First Silver Medal for contest
119 Pryor's patent Pulveriser ... ... A. Pryor, jun.
120 Husband's patent Oscillating Cylinder Stamper, W. Husband
First Silver Medal
121 Nicholls' Pulveriser ... ... Capt. Nicholls
122 Davey's Differential Engine Gear ... Hathorne, Davey & Co.
Second Silver Medal
123 Hand-power Percussive Rock Perforator Glover & Hobson
124 2-H.P. "Otto" Silent Gas Engine ... Crossley Bros.
First Silver Medal

NAVAL ARCHITECTURE.

151 Model of Ship's Lifeboat, self-emptying, length 24 feet, ¾ in. scale ... ... Edward Haly
Second Silver Medal
152 Model of Iron Steamer, length 102 ft., breadth 16 ft., draft 10 ft. 2½ in. ; half-in. scale ditto
Prize £1
153 Model of Mosquito Boat, length 16 ft., 1 in. scale ditto
154 Model of Copeman's patent Seat Raft ... E. S. Copeman
155 Patent Water Brake ... ... Capt. Heathorn
156 Model of 20 ton Yacht, length 68 ft., beam 9ft., ½ in scale G. E. Corlyon
157 Model of Steam Seine Boat, length 37ft., beam 9 ft. 6 in. ditto
158 Model of Pilot Boat, length 75 ft., beam 15 ft. T. R. Blamey
159 Model of S. S. "Mozel," wrecked at the Lizard, Aug. 9th, 1882. ... ... Chas. J. Jenkin
Prize 10/- for Workmanship

FINE ARTS.

Section 1a.—Contributed and Professional Artists' Oil Paintings.

176	Study of Old Man ...	Louisa Elton	10	0	0
177	May Blossoms ...	M. A. G. Evans	3	3	0
178	The Recruit	Francis Lane	14	14	0
179	Steeple Rock, Kynance	Thomas Hart	10	10	0
180	Kynance Cove, from the Rill	ditto	10	10	0
181	St. Michael's Mount ...	ditto	10	10	0
182	Kynance Cove ...	ditto	6	6	0
183	The Morning Haul ...	Geo. Carter	4	4	0
184	A Sou'wester in Househole Bay, Lizard	H. Passingham Hart	5	5	0
185	The Lion Rock, Lizard ...	J. C. Uren	2	2	0
186	The Ear Rock, Lizard ...	ditto	2	2	0
187	Apple Blossom ...	M. A. G. Evans	3	3	0
188	"Now came still Evening on"	H. Davies	3	10	0
189	Porte de Courtrai ...	Richd. Quance	3	3	0
190	Falmouth from the south	John Richardson	2	10	0
191	Watergate Bay, Cornwall	... ...	10	10	0
192	Single Dahlias ...	Maria Tuke	5	5	0
193	Freshwater, Isle of Wight	Sydney Hodges	21	0	0
194	On the Thames, after Sunset	ditto	25	0	0
195	Evening, Cookham Church	L. Leroux	4	10	0
196	The Harvest Field, scene at Mothecomb	Thos. Dingle, jun.	6	0	0
197	Dead Birds ...	... Lilian Haslope	5	5	0
198	At Lynmouth ...	...Sydney Hodges	10	0	0
199	Loading Granite at Dielette, Normandy	Henry Tuke	7	7	0
200	Monthly Roses ...	... Lilian Haslope	4	4	0

201	A Breezy Morning	H. J. Welch	3	10	0
202	After the Wreck	Francis Lane	3	13	6
203	The Castle of Brabant	Richard Quance			
204	Off Flushing Quay	John Richardson			
205	April day on Cornish Coast	Chas. Wells	10	10	0
206	Coast Scene	J. R. L. Hazeldine			
207	Sunset on the Dee	L. Leroux	5	10	0
208	On the Exe	W. Williams	5	0	0
209	On the Tavy	ditto	5	0	0
210	Chalk Cliff, Freshwater,	Sydney Hodges	21	0	0
212	Lilacs	M. A. G. Evans	3	3	0
213	Plymouth Market Girl	E. Opie	13	13	0
214	On the Lyd, Dartmoor	W. Williams	40	0	0
215	Show People, en route	E. Opie	29	10	0
216	On the Fleet, Cookham, Berks	Julia Bertha	4	15	0
217	Portrait	B. S. Marks			
218	Falmouth from Flushing	C. Napier Hemy			
219	Portrait of Miss Mabel Watts	S. Hodges			
220	In the Lledr Valley, N. Wales,	C. Davidson			
221	Rabbi Reading	B. S. Marks	52	10	0
222	Crossing the Common	Julia Bertha	5	10	0
223	Sunrise, Capel Curig	L. Leroux	5	0	0
224	An Alien	Frank Dicksee	47	5	0
225	Doone Valley, Exmoor	Sydney Hodges	84	0	0
226	A Private View	Francis Lane	18	18	0
227	Cadgwith	Thomas Hart	6	6	0
228	St. Michael's Mount	ditto	10	10	0
229	Cawsand Beach, Morning	W. Gibbons	10	10	0
230	After a Summer Storm, Ivybridge,	J. B. Clarke	8	8	0
231	Hurrying Home, Peak Rock, Polperro,	Wm. Gibbons	10	10	0
232	Gwavas and Newlyn, from Tolcarne	Richard Quance	40	0	0
233	Children with Apple, contributed by	John Kelway			
234	Welsh Scene	M. A. G. Evans	11	11	0

Section 2b.—Contributed and Professional Artists' Water Colour Drawings.

277	The Zawn Pig, Mill Bay, Land's End	J. C. Uren	8	8	0
278	A Morning Sketch	Samuel Tresidder	3	3	0
279	Grasmere	James Penson	8	8	0
280	Sketch at Polurian Cove, Mullion	Wm. Casley	5	0	0
281	Coverack—Calm of Eventide	ditto	5	0	0
282	Phlox and Linthorpe Jar	Mary A. Hull	8	8	0
283	June Roses	M. A. G. Evans	3	3	0
284	Henley on Thames	Geo. Hull	9	9	0
285	Houses by the River Durango	Geo. Hart Taylor	5	5	0
286	On the Kennett	Mary I. Grant	8	0	0
287	Old Prison, Durango	Geo. Hart Taylor	5	5	0
288	Pendower Beach, Gerrans Bay,	W. Boase Smith	5	5	0
289	Roborough Down	Nora Taylor	4	4	0
290	A Cornish Garden	Geo. Hart Taylor	3	3	0
291	Pansies	Ellen Genn	4	4	0
292	Cornish Apples	Mary A. Hull	10	10	0
293	Teeds Park, Kent	John B. Babb	1	12	6
294	Cobœa Scandens	Nora Taylor	4	4	0
295	Raspberries	Ellen Genn	7	7	0
296	Laredo, N. Spain	Geo. H. Taylor	2	2	0
297	Tea Rose	Ellen Genn	3	3	0
298	Study of Roses	Maria Tuke	2	2	0
299	Strawberries	Ellen Genn	5	5	0
300	Weston Mills Bridge near Devonport	John B. Babb	1	12	6
301	Cann Woods, Devonshire	ditto	1	12	6
302	To the Laurel Walk, Mt. Edgcumbe	ditto	1	12	6
303	Beddgelert, N. Wales	George Hull	9	9	0
304	Study in Shields Harbour	C. Napier Hemy	8	0	0
305	ditto ditto	ditto	8	0	0
306	ditto ditto	ditto	12	0	0
307	Eyeworth Wood, New Forest	Susan Selley	3	3	0
308	Bumble Rock, Lizard	Samuel Tresidder	3	3	0
309	Raspberries	contributed by J. Mitchell			
310	Patterdale Bridge, Cumberland		3	3	0
311	Vessels driven back by storm, Portreath	J. C. Uren	6	6	0

312	Tregedna	Geo. C. Fox	1	10	0
313	Falmouth—Morning, Evening, Mid-day	Ellen Genn	2	2	0
314	River Fal	ditto	2	2	0
315	Penjerrick Pond ...	Geo. C. Fox	2	2	0
316	Entrance to Penarth Docks	Thomas B. Worth	5	5	0
317	Ullswater, Cumberland ...	James Penson	8	10	0
318	On the Tamar	F. Browning	5	5	0
319	Loch Lomond	ditto	10	10	0
320	Quiet Morning, St. Ives ...	J. C. Uren	6	6	0
321	Stonehouse Pool ...	James Penson	2	10	0
322	Old Lizard Head from Carthilion	W. B. Smith	7	7	0
323	The Thames above Richmond Bridge	H. A. Luscombe	10	10	0
324	King Arthur's Castle, Tintagel	Thos. Hart	75	0	0
325	Study of Serpentine Rocks, Kynance	H. Passingham Hart	5	5	0
326	Bay of Santonia Serada, N. Spain	Geo. Hart Taylor	8	8	0
327	Rescue of a Shipwrecked Crew by Cornish Fishermen off the Land's End ...	J. C. Uren	13	13	0
328	Group of Flowers ..	Geo. Hart Taylor	10	10	0
329	Lobster Boats, Penberth Cove	C. T. Davidson	26	5	0
330	Trees under Melingey ...	Geo. Hart Taylor	10	10	0
331	An Autumn Afternoon ...	Mary I. Grant	10	10	0
332	San Sebastian in a Storm ...	Geo. Hart Taylor	7	7	0
333	Prideaux Place, Padstow ...	H. A. Luscombe	8	8	0
334	Pansies	Ellen Genn	3	3	0
335	Allamanda	ditto	2	12	6
336	Wallflowers	ditto	3	3	0
337	Clearing between Showers, Perran Creek	Geo. Hart Taylor	3	3	0
338	Pinks	Ellen Genn	2	12	6
339	"The sunset lights my footpath home"	Thos. Dingle, Jun.	7	0	0
340	Dean Stanley's Pulpit ...	W. Casley	10	0	0
341	On the Plym ...	Frank Browning	5	5	0
342	Kynance Cove	Susan Selley	3	3	0
343	Trawlers, Mount's Bay ...	Geo. Carter	4	4	0
344	Ear Rock, Mullion ...	W. Casley	25	0	0
245	The Chimney Corner ...	Henry R. Babb	10	0	0
346	Group from Still Life ..	M. A. G. Evans	4	4	0
347	The Old Manor House ...	Henry R. Babb	8	8	0
348	Tintern Abbey ...	Thomas B. Worth	7	7	0
349	Polcsath, near Pentire ...	Mabel Bere	2	2	0
350	Cabin of Fishing Boat ...	W. Boase Smith	3	10	0

351	Wrecked Barges, Swanpool	Saml. Tresidder	4	4	0
352	Stormy Day, Kynance	Harry Preston			
353	At Ventnor, Isle of Wight	S. Hodges	6	6	0

Section 2 a.—Oil Paintings by Amateurs.

400	Rhododendron	Claudine Coode	
401	Stormy Weather near Pendennis Castle	Alfred Harris	
402	White Rose	F. G. Barratt	
403	Bay Mare "Isis"	J. N. Chichester	
404	Sketch, from nature	Rachel James	
405	La Senorita	Walter D. Finch	
406	Horse, after Landseer	Geo. B. Benford	
407	The Reaper	Henry Preston	
408	Pony, Mare, and Foal	J. N. Chichester	
409	Group of Flowers, from nature,	Chas. Elgar	
410	Fishing Boats at Sea	F. Massey	
411	Barberry and Laurustinus	Fanny G. Barrett	*Commended*
412	Portrait	Constance Hill	*First Silver Medal*
413	Cliffs, North of Tintagel	Rev. J. Jane	
414	Favorite Hunter	H. Chichester	
415	Norman Peasant	ditto	
416	Trevarrian Head	W. C. E. Serjeant	*First Bronze Medal*
417	Bedruthan Steps	ditto	
418	Study of a Child	Constance Hill	
419	Red Poppy	H. Chichester	
420	A Study	Constance Hill	
421	Lion's Head	G. B. Benford	
422	Incident in the Life of Charles the Bold	T. Brimacombe	
423	"Peace be to this House"	ditto	
424	Age and Decay	W. C. E. Serjeant	

Section 2 b.—Water Colour Drawings by Amateurs.

450	King Arthur's Castle	Theresa Hoblyn
451	Old Farm House near Perranporth	Martha Pill *Commended*
453	Old Tower at Lynmouth	Theresa Hoblyn
454	Porta Ostiensis, Pyramid of Cestius, and English Cemetery, Rome	Samuel Kerswell *Commended*
455	Coaling from "Gorilla," Falmouth Harbour	G. F. Bridges
456	View from Trefusis	Theresa Hoblyn
457	Shady Lane	Martha Pill
458	May Blossom	Rachel James *Commended*
459	Looe Harbour, Evening	S. F. Stokes *Commended*
460	Flushing	Theresa Hoblyn
461	Waterfall	D. W. Trump
462	Street in West Looe	S. F. Stokes
463	Sunset on the Coast	G. F. Bridges
464	Looe	S. F. Stokes
465	American Currant	Geo. B. Benford
466	Lynmouth	S. Kerswell
467	Wall Flowers in Vase	Alfred Finch
468	St. Michael's Mount	J. H. Skinner
469	Falmouth Harbour	Mary Baker
469A	Coast Scene	D. W. Trump
470	Mist	Rev. J. Jane
471	A Cold Morning	ditto
472	Palm Trees, Bordighera	Samuel Kerswell
473	Running for Plymouth Breakwater	G. B. Benford
474	St. Knighton's Kieve, Cornwall	Rev. J. Jane *Commended*
475	A Winter Evening	ditto
476	Fight between Heron and Falcons	Catherine C. Budd *Commended*
477	Summer Flowers	Carrie Taylor
478	Mullion, Cornwall	J. O. Nash *Second Silver Medal*
479	French Girls at Well	ditto
480	Old Mill	J. H. Skinner
481	Flood over the Weir	Rev. J. Jane
482	Geraniums	Owen Reynolds

483	St. Michael's Mount	E. C. Best
484	Paul Meyson	Owen Reynolds
485	Nasturtiuns	Geo. B. Benfold
486	Old Mill	S. F. Stokes
487	Examples after Rowbotham ...	Owen Reynolds
488	Kynance	E. C. Best
489	Arch Rock, near Falmouth ...	Mary B. Gedge
490	Still Life	— Randall
491A	Tiger Lily	ditto
491	Book of Sketches	G. J. Bridges
492	Outline Sketches, original	Eliza Reed
493	Book of Sketches	F. J. Heaton
494	Portfolio of Sketches	E. Heaton
495	Four drawings of Flowers, from Nature ...	K. Robinson

Section 3a.—Pen, Ink and Crayon, &c.

493A	Portrait of Rt. Hon. W. E. Gladstone, enlarged from photo ...	Samuel Williams	2	2	0
494A	Ditto, Lord Beaconsfield	ditto	2	2	0
495A	An Old Salt	E. R. Eastlake	3	3	0
496	At the Well	ditto	1	10	0
497	"Weary"	ditto	2	2	0
498	"The thoughts of youth are long, long thoughts"	ditto	3	3	0

Amateur.—Pen, Ink and Crayon.

500	Ruins of Arch	Wm. Oke
501	Study in Crayon, from published study...	Matthew P. Garland
502	A Group of Celebrities	William Sollick
503	Dog's Heads	Thos. Welch
504	Horses Feeding	ditto
505	Study in Crayon	Matthew P. Garland
506	Crayon, after Millais...	S. M. Abbott

507	Fettered Sheep	Wm. Oke
508	Bust of Diomede	G. B. Benford
509	Noah's Sacrifice	Richd. Littlejohns
510	Evening in the Meadow (copy) ...	Ed. Manning
511	A Sketch (copy)	F. G. Clark
512	An old Barn	ditto
513	Discobolus of Myron (copy)	Thomas Welch
514	Dog and Woodcock (copy)	Wm. Oke
515	Etching (copy)	S. M. Abbot
516	Is this the Glory of War? (copy) ...	G. B. Benford
517	Pencil Study, Washington	M. P. Garland
518	Feeding time in the Highlands ...	Thos. A. Cook
519	Triumphant Procession	Geo. A. Cook
520	Outlines of Leaves, original ...	Beatrice Hart, age 11

Section 4.—Sculpture, Architecture and Ornamental Art.

552	Cactus	A. R. Popham	5 0 0
553	Sunflower	ditto	5 0 0
			Special Premium, £2
554	Repoussé Panel "Iris"	Rosamond Eastlake	
555	"Ocean's wavebeat Shore"	W. C. E. Serjeant	
556	St. Columb Porth ...	ditto	
557	Honeysuckle ...	Rosamond Eastlake	2 0 0
			First Bronze Medal
558	Bramble Leaves ...	Ida C. Wickett	10 10 0
			Second Bronze Medal
559	Morning on the Thames, ...	Claudine Coode	
560	Evening ditto ...	ditto	
561	Gladiolas ...	Petronella Trump	
			First Bronze Medal
562	Snapdragons ...	Rosamond Eastlake	
563	Arum Lilies ...	H. L. Haslope	15 0
564	Pendennis Castle ...	Louie Richardson	15 0
565	Entrance to Falmouth Harbour	ditto	15 0
566	Wild Roses ...	Isabella M. Banister	4 4 0
567	Barbetine Vases	Catherine S. Willis	10s. 6d. each

568	Brass Sconce—Ivy Leaves	Margt. Shortland	1	0	0
569	Card Tray	ditto		10	0
570	Pen Tray	ditto		5	0
571	Sconce—Ivy Leaf	K. R. Shortland	1	0	0
572	Ditto	ditto		12	0
573	" Was not that a Dainty Dish "	Mabel Shortland		10	0
574	" To set before a King "	ditto		10	0
575	Pair Drawings on Ivorine	ditto		10	0
576	Copper Sconce with Mirror	M. S. Eastlake	2	0	0
577	Mirror with Brass Repoussé Work	Mabel Bere	2	5	0
578	Ditto in oak frame, carved by	Alice Bere	3	10	0
			Prize 10/-		
579	Painted Fire Screen	ditto	3	10	0
580	Sconce	Mrs. Slade Olver			
581	Ditto	ditto			
582	Ditto panel	Mrs. L. F. Michell		16	6
583	Brass Repoussé Mignonette Box	L. Brown	2	10	0
			Second Bronze Medal		
584	Plate imitation Caldis Ware	Mrs. Harvey	1	10	0
585	Brass Repoussé Panel	Mrs. Richardson			
			Commended		
586	Ditto Bracket and Carving	ditto			
587	Tea Table, Ivy Leaves	Mabel Shortland		8	0
588	Bannerets	Rachel James	1	1	0
589	Pendennis Castle	Maggie Sharp		10	6
590	Land's End	ditto		10	6
591	Kynance	ditto		10	6
592	Plaque	L. B. Tregaskis			
593	Water Lily	ditto			
594	Painted Plate	ditto			
595	Small ditto	ditto			
596	Plaque	Katie Robinson			
597	Leather Work Basket	M. J. Polkinghorn	3	3	0
598	Screen, Painted	ditto			
599	4 Painted Dessert Plates	Mrs. M. H. Williams			
			Second Bronze Medal		
600	Fan Painted with Sea-weeds	F. E. Tripp	5	5	0
601	Fancy Basket				
602	Plaque	Millie Hicks			
603	2 Doyleys, Specimens of Lustre Painting	Miss Hudson			
604	Brass Repoussé Tray	Mabel Bere			
605	Repoussé Silver Napkin Rings	ditto			
			Certificate of Merit		

606 Folding Screen, Painted in Oil Barbara Hext
First Bronze Medal
607 Repoussé Pen Tray ... M. R. Shortland
608 Hand Painted Screen ... L. B. Tregaskis
609 Historic Sheet of Ornament showing the various styles of Nations ... Frederick Wiblin, age 18—copy
610 Hand Painted Fire Screen
611 Architectural Designs ... ... Thomas Clarke
612 Pitcher, imitation Barbotine Pottery ... E. M. Stephens
613 Plaque, " The Crag " ... ... L. B. Tregaskis
614 Painted Bracket ... ... ditto
615 Sofa Pillow, original design, painted in water-colour, A. Pomeroy
616 Pin Cushion ditto ditto ditto
617 Bracket, Wild Convolvulus and Ferns ... ditto
618 Pair Fancy Reed Baskets ... ... Emma Penna
619 Ring, containing Head of Charles I. by Vandyke, said to be one of the four given by the King on the Scaffold
Miss A. Trevenen
620 Christ and the Child ... ... Harry Hems
Second Silver Medal
621 Collection of Old English Coins ... Henry M. Jeffery
622 Terra Cotta Ware—Fountain, Vases, &c.,
Matthews & Co., Royal Potteries, Weston-Super-Mare
623 Portrait of Boy, painted from photo ... Catherine C. Budd
First Bronze Medal
624 Collection of Implements and Ornaments from Solomon Islands ... ... contributed by Dr. Guppy
625 Illuminated Text ... ... F. G. Clark
626 Sconce ... ... M. Symons
627 Bust of late R. W. Fox, F.R.S., from clay model, G. Burnard
628 Examples of Manufactured Slag ... E. Sydney
629 Examples of Satsuma and other Oriental Ware richly decorated ... ... J. Burton
630 Carved Ebony Cabinet ... ... ditto

CRYSTOLEUM.

650	Primroses	Ellen B. Cox		15	0
651	Fruit	ditto		15	0
652	Flowers	ditto		10	6
653	Figure	ditto		12	6
654	Ditto	ditto		3	0
655	Cornflower Maiden ...	W. H. Marshall	2	10	0

656	Tired Out	C. Best		18	6
657	Music	J. E. Blight		15	0
658	Love	ditto		15	0
659	Cornflower Maiden	ditto		5	0
660	Dahlia	A. Williams	2	2	0
661	Early Christian Martyr	ditto		10	6
662	Miss Maud Branscombe	Mabel Shortland		8	0
663	Out of Tune	E. C. Elgar		5	6
664	Ruth and Naomi	A. Williams	1	1	0

PROFESSIONAL PHOTOGRAPHY.

700	Enlargement of Child	Woodbury Permanent Photo. Co.			
701	ditto Group	ditto			
702	ditto	ditto			
703	Madame Modjeska	ditto			
704	Portrait in Opal	ditto			
705	ditto	ditto			
706	Foxgloxes and Ferns	H. P. Robinson	1	1	0
707	Wayside Gossip	ditto	1	1	0
708	Under a Haycock, fast asleep	ditto	1	1	0
709	The Skylark's Nest	ditto	1	1	0
710	The Haymaker's Dinner	ditto	1	1	0
711	What Luck ?	ditto	1	1	0
712	The Pond	ditto	1	1	0
713	A Nor'easter	ditto	1	1	0
714	A Merry Tale	ditto	1	1	0
		Second Silver Medal			
715	Launch of a Deal Galley Punt	ditto	1	1	0
716	The Margin of the Lake	ditto	1	1	0
717	Carrying Hay	ditto	1	1	0
718	Getting under Way	Robert Slingsby			
719	Brambling	ditto			
720	Cornfield—Evening	ditto			
721	Ready	ditto			
722	"I'm coming"	ditto			
723	Lantern Slides of English and Foreign Scenery	P. H. Fincham			

724	Industry	Adam Distin		16	0
725	After the Storm	ditto		16	0
726	Gloaming	ditto	1	0	0
727	Instantaneous Studies of Yachts,	G. West & Son	3	10	0
728	The Lych Gate	G. Higginson	1	1	0
729	Old Water Mill	ditto	1	1	0
730	A Smack on Neptune's Face, Eventide	Frank M. Sutcliffe	1	5	0
731	Frame of Beach Studies	ditto	1	10	0
732	ditto Marine ditto	ditto	1	15	0
733	"The Old Man, his Son, and the Ass" *Æsop*	ditto		10	6
734	"The Schooner and the Sky"	ditto		12	6
735	The Lion Rock—Marsden	J. P. Gibson		7	6
736	The North Tyne, near Chesters	ditto		7	6
737	The Sand Cart	ditto		7	6
738	Warden Rocks, North Tyne	ditto		7	6
739	Dilston Mill, on the Devil's Water	ditto		7	6
740	Iron Gates, on the Allen	ditto		7	6
741	Nether Warden, North Tyne	ditto		7	6
742	North Transept, Hexham Abbey	ditto		10	6
743	Choir ditto ditto	ditto		10	6
744	Burnside Cottages	ditto		10	6
745	Frame of Street Views	Cobb & Son			
		Second Silver Medal			
746	ditto ditto	ditto			
747	Indifference—"The beauty of the Scene is nought to me,"	J. Milman Brown		10	0
748	Starting for Market	ditto		15	0
749	Sandown Bay	ditto		15	0
750	Chine Cottage	ditto		15	0
751	Shanklin Cliffs	ditto		15	0
752	Undercliff, near Niton	ditto		15	0
753	Arreton Manor	ditto		15	0
754	A Misty Morning	ditto		10	0
		First Bronze Medal			
755	Views in Epping Forest	Richard Walter	1	1	0
756	"Rebecca"	Matthew H. Chubb			
757	Harmony	ditto			
758	The Truants	John Chaffin & Son	3	3	0
759	Chit Chat	ditto	3	3	0
760	Too Late	ditto	3	3	0
761	On Pleasure Bound	ditto	3	3	0
762	Portrait Study	Frederick W. Broadhead	1	1	0
763	ditto	ditto	1	1	0
764	Frame, Views Bradgate Park	ditto	2	2	0

765	A May Morning on the Wear & Nature's Mirror	W. McLiesh	2	2	0
766	Misty Morning on the Wear	ditto	1	1	0
		First Silver Medal			
767	Miss Maud Parsons	Norman May			
768	" What shall I answer him "	ditto			
769	Patience	ditto			
770	Fairy Tales	ditto			
771	Ye Antient Mariner	ditto			
772	The Straits, Dovedale	Frederick Waley	1	1	0
773	Portrait of Lady	ditto	1	1	0
774	Frost Studies	George Renwick			
775	ditto	ditto			
776	ditto	ditto			
777	ditto	ditto			
778	ditto	ditto			
779	ditto	ditto			
780	ditto	ditto			
781	ditto	ditto			
782	View on the Jed, near Jedburgh	John Jackson	1	1	0
783	Old Norman Doorway	ditto	1	1	0
784	Interior St. Mary Redcliffe	ditto			
785	Group	James S. Catford			
786	Portrait	ditto			
787	Landscape, Capstone Parade, Wildersmouth	ditto			
788	Frame of Views	T. G. Whaite			
789	ditto	ditto			
790	ditto	ditto			
791	ditto	ditto			
792	ditto	ditto			
793	Frame of Panel Portraits	W. J. Byrne			
		Second Silver Medal			
794	On the Yarrow	Luke Berry	0	10	6
795	Tiger Falls, Rivington	ditto	0	10	6
796	Any more for Sailing	ditto	0	12	6
797	Chat by the Mill	ditto	0	12	6
798	See-Saw	ditto	0	12	6
799	Going to Market	ditto	0	12	6
800	Portrait of a Gentleman	Edwin S. Ellery			
801	A Ganges Boy	ditto			
802	Portrait	ditto			
803	ditto	ditto			
804	ditto	ditto			
805	Surprise	E. Day & Son		15	0
806	Intelligence	ditto		15	0

807	Pensiveness	E. Day & Son		15	0
808	Marguerite	ditto		15	0
809	Henley Regatta	Johnson, Bros.		7	6
		First Bronze Medal			
810	ditto	ditto		7	6
811	ditto	ditto		7	6
812	Reapers	ditto		5	6
813	Dutch Cows	ditto		7	6
814	Cornfield	ditto		7	6
815	Reapers	ditto		7	6
816	Boat-house on the Fal	Frederick Argall	4	10	0
	Not for Competition				
817	Dr. Benson, Archbishop of Canterbury	ditto	3	0	0
818	Portrait of Child	W. M. Harrison			
	Not for Competition				
819	ditto	ditto			
820	Study of Boatmen	ditto		10	6
821	Portrait of Lady in Fancy Dress	ditto		10	6
822	Cabinet Portraits	Walter W. Winter		10	9
824	The Rivals	Lyd. Sawyer			
825	Homeward Bound	ditto			
826	Lantern Slides	G. W. Gwyre			

AMATEUR PHOTOGRAPHY.

844	Life and Scenery in Wilds of Labrador and Ungava	Joseph R. Holmes
		First Bronze Medal
845	Stairhole Rocks, Dorsetshire	J. G. Horsey
846	Dungy Point	ditto
847	Batts Head and Swire Head	ditto
848	Lulworth Cove	ditto
849	Rocks near Lulworth	ditto
850	Near Stairhole	ditto
851	Views in Kent and Dorset	ditto
852	Church of Maria Salute, Venice	Thomas M. Brownrigg
853	The Bridge of Sighs, Venice	ditto
854	The Fishing Net, Vianggio	ditto
855	The Rialto, Venice	ditto
856	Grand Canal, from the Rialto	ditto

857	Grand Canal, from the Iron Bridge	Thomas M. Brownrigg
858	Pia Mulira	ditto
859	San Giovanno, Lago Maggiore	ditto
860	Near Eastling, Surrey	ditto
861	Ditto, Village, Surrey	ditto
862	In the Wood, Blackwater, Berkshire	ditto
863	Near Elstead	ditto
864	Swiss Views	Cecil V. Shadbolt
865	Hoar Frost (tree studies)	ditto
866	Ditto ditto	ditto
867	Instantaneous Marine Views	Alfred G. Tagliaferro
868	Views, North Wales	Wm. R. Ridgway
869	Sketches on Beach, Hastings	Chas. A. Ferneley
870	Ditto of English Rural and River Scenery	ditto
871	Views of Lynmouth	Edward Brightman
872	Ditto on the Frome	ditto
		First Bronze Medal
873	Still Waters	ditto
874	Views Tintern Abbey	ditto
875	Ditto at Stapleton	ditto
876	Views Cuban Garden	P. H. Emerson
877	Ditto	ditto
878	Broad Guage Express Engines at Full Speed	Rev. A. Malan
		Second Bronze Medal

PHOTOGRAPHIC APPLIANCES.

879	New Patent Camera	George Hare	7 10 0
			First Silver Medal
880	Instantaneous Shutter	W. G. Tweedy	
881	Model of same on large scale	ditto	
882	New Model Dry Plate Camera	J. F. Shew & Co.	
883	Instantaneous Shutter	ditto	
884	Portable Folding Changing Box	ditto	
885	2 Leather light-tight Dry-plate Boxes	ditto	
886	Model of Lantern Screen and Elevator, portable	W. H. Oakley & Co.	

887	Lecturer's Reading Lamp with Signal and Gong	W. H. Oakley & Co.		
888	Interchangable, mixed, or blow-through Jet, with improved double-regulation cock ...	ditto		
889	Double-regulation Gas Cock for Jet ...	ditto		*Second Bronze Medal*
890	Universal Tripod Stand for small Cameras	ditto		
891	ditto for large ditto	ditto		
892	Tripod Stand	James Cheney		
893	Dry Plate Changing Bag ...	ditto		
894	Lantern Screen Elevator ...	ditto		

NATURAL HISTORY.

900	Mineral Grotto ...	F. W. Smith		
901	Case of Birds ...	Richard H. Old		
902	Case, Fox and Duck ...	W. Howard Bunn	3 3 0	
903	Case of 2 small Perch, 1 Roach	ditto	15 0	*Prize 10/-*
904	Case, Black Bream ...	ditto		
905	Pair of Sacup Ducks, and one Matted Duck ...	ditto		
906	Case containing 1 Dace, 2 Roach, 3 Perch, and 1 Bream ...	William Barber	7 0 0	*Prize £1*
907	Case of 2 Bream ...	W. J. Hodges	1 10 0	*Prize 10/-*
908	ditto	ditto		
909	Owl	ditto		
910	Hawk	ditto		
911	Book of Sphagna of West Cornwall	William Curnow	1 11 6	*First Bronze Medal*
912	Collection of Wild Plants ...	R. M. James		*Prize 5/-*
913	Collection of British Wild Flowers	Florence Pease		*Prize £1*
914	Calendar of Nature ...	J. G. Wells		*Prize £1*
915	Case of Fishing Tackle, Patent Reels, &c.,	David Sclater		*First Bronze Medal for Reels*
916	Bottle of Guano and other Earths, from Bolivia,	M. Hodge		

917 Improved British Standard Bar Frame Hive, H. K. Moxey
Highly Commended
918 Improved Packing Crate for safe conveyance of honey ... ... ditto
919 Improved Sectioner Tray ... ... ditto
920 Concentric Nodule from Section of Dyke at Penryn Saw Mills Contributed by Howard Fox
921 Indoor Revolving Observatory Beehive, designed to show all Combs on both sides
Revd. A. Malan
Second Bronze Medal
922 Marine Aquarium ... ... The Misses Brown
923 Case of Foxes, taken near Falmouth
Contributed by J. Burton

SHORTHAND.

First Prize ...	John Olver	£1	1	0
Second Prize ...	James H. N. Williams ...		15	0
Third Prize ...	Mary U. Francis ...		10	6
Fourth Prize ...	Michael H. Barkell ...		7	6
Fifth Prize ...	Thomas H. Edwards ...		6	0
Sixth Prize ...	Henry Letcher and ...		5	0
	Samuel J. Hooper ...		5	0

"LANDER" COMPETITION.

940	Map and Essay, Mexico ...	Philip Sedgman, age	9	*Prize* 4/-
941	ditto ...	J. G. Wells „	17	
942	ditto ...	Harry Lovell „	13	*Prize* 21/-
943	ditto ...	Fred. Williams „	13	*Prize* 15/-
944	ditto ...	Florence L. Pearson „	15	*Prize* 12/-
945	ditto ...	G. A. Simmons „	12	
946	ditto ...	Edward Uren „	14	
947	ditto ...	Samuel Trounson „	17	*Prize* 8/-
948	ditto ...	F. Clark „	17	
949	ditto ...	Francis H. White „		

NEEDLEWORK.

Enys School.

950	Night Dress	...	cut and made by	Bessie Rogers,	age 12	
951	ditto	...	ditto	Louie Bennett	„ 11	
952	ditto	...	ditto	Beatrice Barrow	„ 12	
953	ditto	...	ditto	Gertrude Lawrence	„ 9	
954	ditto	...	ditto	Elsie James	„ 9	
955	Chemise	...	ditto	Kate Treneer	„ 8	
956	ditto	...	ditto	Kate Martin	„ 9	
957	Patchwork by Children from 7 to 12					*Prize 2/-*
958	ditto „ 6 to 9					
959	Ditto and Knitting	...		Sarah Martin,	age 6	
960	Specimen of Infant's Work	...		Louisa Williams	„ 5	
961	ditto	...		Mary Hearne	„ 4	
962	Ditto by Children 8 to 11					*Prize 1/-*
963	Stockings	... ...		Annie Treneer	„ 12	
964	ditto	... ...		Rosie Williams	„ 11	

Truro Wesleyan Day School.

965	Patch counter-hem Shirt			Alice Penrose	„ 7	
966	Night Dress	...	cut and made by	Edith Harris	„ 12	
967	ditto	...	ditto	Nellie Tippett	„ 11	
968	Shirt	...	ditto	Kate Penrose	„ 12	
969	ditto	...	ditto	Alicia Thomas	„ 12	
970	Night Dress	...	ditto	F. Penrose	„ 10	*Prize 2/-*
971	Chemise	...	ditto	Alice Penrose	„ 7	
972	Fancy Pinafore	...	cut and made by	Annie Braid,	age 11	
973	Knitted Stockings	... ...		Alice Penrose	„ 7	*Prize 1/-*
974	ditto Stocking	... ...		F. Penrose	„ 10	
975	ditto	... ...		K. Penrose	„ 12	

Falmouth Board School.

976	Night Dress	... ...		Emily Lobb,	age 12	*Prize 2/6*
977	Sampler	... ...		ditto		
978	Knitted Stockings	... ...		ditto		*Prize 1/-*

979	Child's Frock	Eliza Reed		
980	Specimen of Darning	ditto		
				Prize 2/6
981	Night Dress	Annie B. Thomas	age 12	
				Prize 2/-
982	Chemise	Isabella Angel	„ 14	
				Prize 2/6

Falmouth British Infants' School.

983	Pinafore	Joseph Tresidder	
			Prize 1/-
984	Antimacassar, &c., by several children		*Prize 2/6*
985	Bath Towel, by children between 6 and 7.		*Prize 2/-*

Coverack Board Schools.

986	Night Dress	Susan Roskilly	„ 8	
987	Chemise	Mary Corin	„ 10	
988	ditto	Emily Barker	„ 8	
989	Chemise	M. R. Rickard	„ 13	
990	Flannel	P. H. Barker	„ 12	
				Prize 2/-
991	Shirt	ditto		
				Prize 1/-
992	Bodice	ditto		
				Prize
993	Shirt	Bessie Roberts	„ 11	
				Prize 1/-
994	Chemise	Emily J. Trip	„ 13	
995	ditto	Grace Haydon	„ 11	
996	ditto	Johanna Bray	„ 13	
997	Shirt	Lillie Christophers	„ 11	
998	Bodice	C. Lawrence	„ 12	
999	Child's Pinafore	Grace Trip	„ 9	

FANCY WORK

1	Crochet Pianofore	Margaret Northey		4	6
2	ditto Apron	ditto		2	6
3	Patchwork	Jessie Worley	3	3	0

4	Patchwork Centre	Mary T. Reed	*Prize 2/-*
5	Ditto ditto	ditto	
6	Ditto Counterpane	ditto	*Prize 5/-*
7	Ditto ditto "Light and Shadow from Lincoln's Log Cabin"	ditto	
8	Crochet Collar, original design	A. E. Gedye, age 18	
9	Patched Cushion	Eliza Allen	

ART NEEDLEWORK AND LACE.

20	Purple and Yellow Iris, designed and worked from nature	Mary Mason				
21	"Love lies bleeding" S. K. Embroidery,	ditto				
22	Mantel Vallance	Mrs. Hooper	2	2	0	
23	Table Cloth	ditto	2	2	0	
24	Huckaback Square, original design	C. B. Genn	2	2	0	*Highly Commended*
25	Border of Poppies, bought design	ditto				
26	Day Quilt, worked in satin crewel, rope, button hole, and knotted stitch, from old design	E. Genn	5	5	0	*Prize £1*
27	Piece of original Art Embroidery, price when finished	Jeannette Raven	3	3	0	*Highly Commended*
28	Banner Screen, original design	Miss Cregoe				
29	12 Yards Berlin-wool Work	E. F. Smart	5	5	0	

40	Honiton Lace	E. F. Smart	5	0	0
41	Tie Ends	ditto		5	0
42	Front of Dress	ditto	2	16	0
43	Ruffles to match	ditto	1	10	0
44	Tie Ends	ditto		3	6
45	Collar	ditto		8	6
46	Cap	ditto	1	11	6
47	Ditto	ditto		15	0

48	Cap Lappets	E. F. Smart		6	0
49	2 Yards utilised as Trimming for Dress	ditto	1	4	0
50	Ditto	ditto	1	4	0
51	1 Yard, Sunflower	ditto		16	6
52	Ditto	ditto	1	15	0
53	Length of real Old Point, beautifully repaired	ditto	1	10	0
54	Length of Old English Point	ditto per yd.	2	0	0
		53 and 54 Prize 10/-			
55	Ditto	ditto per yd.	2	0	0
56	Hair-pin Lace ...	Miss Dunstan		2	6
57	Honiton Lace Handkerchief	H. Ellis White			
58	Lace, handworked, beginning of this century	Miss Trevenen			
59	Ditto	ditto			
60	Old Lace	ditto			
61	Crochet Lace, original design	A. L. Wavish			
62	Collar, English Point	M. J. Polkinghorne			
63	Lace Quilt, Guipure d'art, made in one piece, 3 square yards	Frances M. Hext			
		Highly Commended			

EARLE, MACHINE PRINTER, QUAY, FALMOUTH.

PRIZE LIST, 1884.

ROYAL CORNWALL POLYTECHNIC SOCIETY,

FOR THE ENCOURAGEMENT OF

SCIENCE AND THE FINE AND INDUSTRIAL ARTS.

INSTITUTED 1833.

PATRONESS:
HER MOST GRACIOUS MAJESTY THE QUEEN.

VICE-PATRON:
HIS ROYAL HIGHNESS THE PRINCE OF WALES.

PRESIDENT:
THE RIGHT HON. THE EARL OF MOUNT EDGCUMBE.

VICE-PRESIDENTS:
James Jago, M.D., F.R.S.
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TREASURER:
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WILSON LLOYD FOX, F.R. Met. Soc.

SECRETARY:
EDWARD KITTO, F.R. Met. Soc.

CURATOR:
R. N. WORTH, F.G.S.

ROYAL CORNWALL
POLYTECHNIC SOCIETY.

THE FIFTY-SECOND
ANNUAL EXHIBITION
WILL OPEN AT THE
POLYTECHNIC HALL, FALMOUTH,
On TUESDAY, AUGUST 12th, 1884.

THE
ART UNION OF CORNWALL
(UNDER THE SANCTION OF THE BOARD OF TRADE),

Selects its Prizes from the Works exhibited by Professional Artists.

The Drawing for Prizes will take place at the Polytechnic Hall during the Exhibition.

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* Information respecting the Photographic department may be obtained from Mr. W. Brooks, Laurel Villa, Wray Park, Reigate, (member of the General Committee).

Information respecting the Art Union may be obtained of the Honorary Secretary, Mr. W. W. J. Sharpe, Falmouth.

All information may be obtained personally, or by letter, on application to the Secretary,

EDWARD KITTO, F.R. Met. Soc.,

Polytechnic Hall, Falmouth.

FIFTY-SECOND

ANNUAL EXHIBITION

REGULATIONS FOR COMPETITION.

1. Competitors are divided into two classes.

2. The FIRST CLASS consists of Members of the Society, and of any person paying three shillings to be allowed to compete for Medals and prizes, who shall be entitled to a non-transferable ticket admitting once to the Exhibition.

3. The SECOND CLASS consists of persons of the working order and persons under sixteen years of age. Second class competitors may compete for medals and prizes without any subscription, but are not entitled to free admission to the Exhibition.

4. No competitor shall be entitled to a medal or prize for any article which has appeared at a previous Exhibition of the Society, unless showing some improvement.

5. When medals are awarded the converting them into money according to the following scale shall be at the discretion of the Committee, provided that the applicant already possesses a medal of similar value:—

First Silver Medal	£5	0	0
Second ditto	3	10	0
First Bronze Medal	2	0	0
Second ditto	1	5	0

6. Medals only (not convertible into money) can be awarded to patented or registered articles.

7. No holder of a medal or prize may receive an award of the same or a lower value for similar subjects in the same department at the next two subsequent Exhibitions; but the Committee are empowered to give certificates of merit to persons excluded by this rule.

8. The Committee are empowered to withhold any medal, prize or premium, at their discretion.

9. Every Exhibitor must sign the Entry Form, to be obtained of the Secretary, before his exhibit can be received by the Society.

10. All Articles intended for exhibition must be delivered at the Polytechnic Hall, Falmouth, not later than Tuesday, August 5th, or they will not be eligible for competition.

Medals and Prizes.

MECHANICS.

Medals and Prizes in Books or Money are offered by the Society for useful Inventions or Improvements, which must be explained by models or drawings and full descriptions. The drawings to be sufficiently large to be distinctly seen. All descriptions and communications should be written on foolscap paper, on one side only, leaving one inch margin.

Sec. I.—Rock Drills, Steam Engines and Boilers and Machinery connected therewith, &c.

Medals are offered by the Society for:—

1. Rock Drills applicable to this County, to be tested in competition (provided not less than three entries be made) as to power and economy, and upon such conditions as the Judges shall determine.
2. The best machine (having regard to efficiency and economy) for compressing air for working Rock Drills.
3. The best Safety Appliance for securing Skips or Cages adapted for use in Cornish Mines.
4. The best Method of Construction of Cornish Boilers, having in view the lessening of the effects of the corrosive action of the impure water in Cornish Mines.
5. The best non-conducting material (harmless in its effect on metals) for covering Steam Boilers, Cylinders, and Steam Pipes, to be tested in competition as to its waterproof qualities, efficiency in resisting the radiation of heat, facility in use, durability, and economy of cost.
6. Improved Stamping Machinery.

NOTE.—Steam will be supplied free of cost, and every facility will be given by the Society for conducting these trials, and for exhibiting all machinery, which will be placed under cover.

In addition to the Medals and Prizes offered by the Society, the following Premiums are open for Competition :—

1. DRESSING ORES. A Premium by the Society for improved Machines for, or modes of, Dressing Ores.

2. COLLECTIONS OF ORES. A Premium is offered by the Society for Collections of Ore and Matrix in which the relations of one to the other are carefully marked.

3.—CROSS SECTIONS. A Premium not exceeding £3, by the Society, for accurately-drawn cross sections of Cornish Mining districts.

Medals and Prizes in Books or Money are offered for Essays and Scientific Papers.

SPECIAL PREMIUMS.

1. IMPROVED TREATMENT OF ORES AND MINERALS. Three Premiums, in Books, by the Editor of the *Mining Journal*, value £3 3s. for the best, £2 2s. for the second best, and £1 1s. for the third best papers, by practical Miners or others engaged about mines, upon a method, mechanical or chemical, of making marketable, with commercial advantage, ores or minerals raised from mines in Cornwall or Devon, and hitherto regarded as worthless. The books shall be chosen by the writer of the paper. In the case of mechanical methods not in actual use, it must be demonstrated that the apparatus is simple, durable, and not likely to get out of order. In case of chemical methods not in actual use, samples of the products in the various stages must accompany the paper, in proof of the practicability of the process.

2.—MINERAL VEINS. A Premium of £2 by the Society, and £3 by Colonel Tremayne, for the most exact account of the phenomena of mineral veins in any mine or district; their dip, direction, variations in productiveness, slides, heaves, &c.

3.—DUTY OF CORNISH ENGINES. A Premium is offered by the Society for the best Essay treating on the reasons for the diminished duty of Cornish Pumping Engines, and giving practical suggestions for its improvement.

All papers in this section must be sent to the Secretary **at least three weeks** before the Exhibition commences.

Sec. II.—Sanitary and Domestic Inventions and Improvements.

1. A Premium is offered by the Society for improved Stoves for economising fuel.

2. A Premium is offered by the Society for an improved system of Ventilation of Dwellings and Public Buildings.

3. A Premium is offered by the Society for improved methods of making casement windows weather-tight.

4. A Premium is offered by the Society for the best model of a Cottage Roof—span not exceeding 20 feet.

Section III.—Other Branches of Mechanics.

The Society offers Medals and Prizes in Books or Money for:—

1. Useful Inventions and Improvements.
2. Models or drawings of Machines or Mechanical Appliances by workmen and apprentices.
3. Specimens of good workmanship by Amateurs, Workmen or Apprentices.

PRIZES OFFERED TO APPRENTICES.

1. Prize of 10s. 0d. for the best specimen of Joinery, by boys under 17.
2. ,, 7s. 6d. " " " " 15.
3. ,, 10s. 0d. for the best specimen of Wood Carving, by boys under 17.
4. ,, 7s. 6d. " " " " 15.
5. ,, 10s. 0d. for the best specimen of Wood Turning, by boys under 17.
6. ,, 7s. 6d. " " " " 15.

Section IV.—Gas Manufacture and Apparatus.

MURDOCK COMMEMORATION.

The Society being anxious this year to commemorate the discovery and application by W. Murdock of Coal Gas as an Illuminant, specially invites Manufacturers and others concerned in this extensive field of enterprise, to contribute by Models, Diagrams, and otherwise, to a historical collection and exhibition, with special reference to this subject.

A Medal is offered by the Society for the best Historical Essay on the Progress of Gas Manufacture from the time of Murdock's experiments to the present day.

Exhibits are also invited in the following departments:—

1. GAS DISTRIBUTION. Pipes of different makes and materials and fittings for the same.

   A Bronze Medal is offered for the best exhibit of Brass Fittings for Iron Tubes.

2. MEASURING AND TESTING OF GAS. Exhausters, Meters, Pressure Gauges and Governors.

3. GAS LIGHTING. A Bronze Medal is offered for the best Street Lamp, having regard to design, improved methods of lighting, ventilation, and cleaning.

4. GAS FITTINGS & APPARATUS FOR LIGHTING DWELLINGS. A Bronze Medal is offered for the best Collection exhibited by the Manufacturer.

A Similar Medal is offered for the best exhibit of these articles, having special regard to economy in price, in conjunction with excellence of design.

5. GAS BURNERS.

6. GAS HEATING STOVES, for Rooms, Public Buildings, and for manufacturing purposes.

7. GAS COOKING STOVES.

8. ACCESSORIES OF VARIOUS KINDS.

9. RESIDUAL PRODUCTS. A Medal is offered for the best paper on the methods, mechanical or chemical, of making marketable, with commercial advantage, the residual products of Gas Manufacture. Samples of the products in the various stages should accompany the paper in proof of the practicability of the processes.

NOTE.—Gas will be supplied free of cost to Exhibitors.

THE JUDGING in all departments of the Exhibition will take place on MONDAY, AUGUST 11th.

NAVAL ARCHITECTURE.

Medals and Prizes, in Books or Money, are offered by the Society for meritorious productions in the various branches of Naval Architecture.

A Premium is offered for the best means of preventing the influx of water into the boiler and engine-room compartments of steam vessels.

STEAM FISHING VESSELS. A special medal is offered by the Society for the best model illustrating the employment of Steam in Fishing Vessels, accompanied by drawings and description; the objects to be aimed at being the reduction of manual labour on-board, freedom from injury to nets or lines, and means of bringing the produce quickly and economically to market.

CHEMISTRY, ELECTRICITY, &c.

Medals, and Prizes in Books or Money, are offered by the Society for improved applications of Chemical Science.

Prizes are offered to Students and Workmen for Analyses of Minerals.

Prizes are offered for Monographs on any groups or families of Salts, as the Phosphates, Arseniates, &c., whether occurring naturally or not.

Prizes are offered for Collections of Artificial Crystals.

A Premium is offered for any new and successful experiment in the application of the Electric Light for use in mines, or otherwise.

FINE ARTS.

Medals and Prizes are offered by the Society for meritorious productions in the following subjects:—

Sculpture and Modelling—Architecture—Art Metalwork—Original Designs adapted for Manufactures in Serpentine, Granite, Porphyry, Terra Cotta, &c.

PROFESSIONAL ARTISTS.

The Society invites Professional Artists to forward their works to the Exhibition. The Art Union of Cornwall selects its Prizes from the pictures exhibited by Professional Artists.

AMATEURS.

Section I.—Oil Paintings and Water Colours.

1. For the best original Figure Picture in Oil—a Silver Medal.
2. For the best original Figure Picture in Water Colour—a Silver Medal.
3. For the best original Landscape in Oil – a Silver Medal.
4. For the best original Landscape in Water Colour—a Silver Medal.
5. For the best China Painting, original design—a Silver Medal.
6. For the best China Painting, design not original—a Bronze Medal.

Note.—All Persons who have ever sold a Picture from an Exhibition shall be deemed *Professional.*

Prizes of 15s. and 7s. 6d. are offered for Water Colour Drawings by persons under 16 years of age. The age to be stated.

Section II.—Pencil, Crayons—Engraving and Etching—Lithography, &c.

PREMIUMS.

£2 is offered by the Society for the best wall or other House decoration, including designs for Needlework.

£1 is offered by the Society, to persons under 20 years of age, in each of the following subjects:—

1. For the best filled Sketch-book, from Nature.
2. For the best series of six Flowers, Leaves, or Animals, from Nature, in Chalk or Pencil.
3. For the best shaded Crayon Drawing of one of the busts in the Polytechnic Hall, full size; or the bust of any well-known character.
4. For the best Engraving on Wood.
5. For the best sketch of Marine Scenery.

Prizes of 10s. and 7s. 6d. are offered for Pencil and Crayon Drawings of flowers from Nature, or of Natural Objects, by persons under 16 years of age. The age to be stated.

PHOTOGRAPHY.

In all cases state whether the work is Professional or Amateur, and name process of production.

All works sent for competition must have been executed within eighteen months of the date of this Exhibition.

Carte-de-visite Portraits are excluded from Exhibition, except when illustrating some special process or novelty.

PROFESSIONAL PHOTOGRAPHERS.

Medals are offered by the Society for meritorious productions in the following subjects:—

1. For Landscapes.
2. For Portraits.
3. For Composition Pictures.
4. For Instantaneous Pictures.
5. For Interiors.
6. For Transparencies for Lantern or Window Decoration.
7. For Pictures by improved processes.
8. For Enlargements.

All enlargements for competition must be the work of the Exhibitor.

AMATEURS.

Medals are offered for meritorious productions in this department.

PHOTOGRAPHIC APPLIANCES.

Medals are offered for improved Apparatus and Appliances, including Magic Lantern Apparatus, &c.

All exhibits in this department must be accompanied by a written explanation of their specialities.

* See foot note, page 2.

NATURAL HISTORY.

Essays, Local Observations, Collections of Specimens, particularly such as Illustrate the Natural History of the County.

All papers in this Section must be sent to the Secretary at least three weeks before the Exhibition commences.

Specimens must be properly arranged and accurately named, and should be accompanied by a paper stating when and where they were found, &c., and when practicable by observations made by the exhibitor.

Prizes will be especially given for Monographs of any particular family or large genus indigenous to the County, either in Botany or Zoology, such as the *Gramineæ* or *Hieraceæ ;* the *Holothuridæ* or the *Medusæ ;* the *Palmipedes ;* the *Rodentia ;* &c.

Prizes are offered for the following objects:—

1. **Aquaria.**
2. **Collections of Wild Plants—distinguishing between those which are poisonous and those which are not poisonous.**
3. **Insects (named and classified) which are noxious to vegetation.**

SPECIAL PREMIUMS.

1. **A Premium of £2, or books to that value, at the discretion of the Judges, for the best Illustrated Journal of Natural History.**
2. **A Premium of £2, or books to that value, at the discretion of the Judges, for the best Calendar of Nature, presenting in a tabular form the comparative view of the dryness or moisture of different years; exhibiting also the advance of the season by the time at which various trees, plants, &c., burst into leaf or flower—taking of course, the same trees each year.**
3. **A Premium of £2 by the Society, for the best paper recording personal observations and experiments as to the movements of carniverous plants.**
4. **A Premium of £2 by Mr. Alfred Lloyd Fox, for the best collection of Cornish Fossils, to be accompanied by descriptions, &c.**
5. **A Premium of £1, by Mr. T. Webber, for Specimens of Amateur Bird-stuffing—for a case of not less than two birds—particular attention to be paid to natural size and position.**
6. **A Premium of £1 by the Society, for specimens of setting up of fish.**
7. **A Premium of £1 for ten original Illustrations of the Natural Families of Plants from Nature. The candidates to be under 16 years of age. The age to be stated.**
8. **A Premium of £2, by Mr. George H. Fox, for the best Essay on the Natural History and Habits of the Crabs, Lobsters and Crayfish on the Cornish Coasts.**
9. **A Premium of £1 by Mr. George H. Fox, for the best Crab and Lobster Pot.**

LANDER PRIZES.

The Prizes to be called the "Lander Prizes" in commemoration of those enterprising Cornish Travellers, Richard and John Lander.

Competitors must be under 18 years of age, and the age to be stated; and the work not to be done during school hours.

SUBJECT FOR 1884—NORTH WEST TERRITORIES OF CANADA.

Mr. J. C. Kennerley offers to the Society, four several prizes, of 25s., 15s., 12s., and 8s., for neat and correct Maps of the North West Territories of Canada. The principal rivers, lakes, chains of mountains, line of sea coast, and the territorial line should be accurately delineated; and the sites of the most important cities and sea-ports, with their latitudes and longitudes, should be correctly marked, also the lines of railway opened and projected. The Maps should be accompanied by the best information (with reference to authorities, which must be quoted) respecting the great physical features of the country, its rivers, the characteristics of the principal chains of mountains, their general direction, height, geological and mineralogical features, more important passes, limits of perpetual snow, and the elevations at which various trees and plants will flourish on their sides; or information respecting its history, the population of its principal towns and cities, with the statistics of their trade and manufactures, or the natural productions of the country, zoology, botany, &c A really good map, if the essay be incorrect or inadequate, to be entitled to one-half of the relative prize, and *vice versa* as to good essays, but imperfect maps.

It is not expected that each map will be accompanied with information on all the subjects specified; they are named as affording hints to guide the competitors, and prompt them to research, and method in arrangement.

Maps and Essays (not to exceed 20 pages) must be sent to the Secretary at least three weeks before the exhibition commences.

SHORTHAND.

Competitors must be under 30 years of age, and the age to be stated.

Prizes are offered by the Society for proficiency in the use of Shorthand to *non professional* writers of it, resident in Cornwall. The skill of the candidates to be tested by their several readiness and accuracy in taking down passages from a book or newspaper read in their presence, and afterwards giving a copy of the Shorthand in ordinary writing. First Prize, £2; Second Prize, £1; Third Prize, 10s.

Pitman's, or any other system, may be used, and arbitrary marks for prepositions, conjunctions, personal pronouns, parts of the verb, "to be," and terminations, such as *ion*, *ing*, &c.

PLAIN NEEDLEWORK.

All work for Competition must be done by the Exhibitors, and must be removed on the morning of the second day of Exhibition, Wednesday, August 13th.

Competition in this department is restricted to the 2nd class (see page 3).

Competitors must be resident in the County of Cornwall, and their age must be stated.

Prizes are offered for Good Plain Needlework, Marking, and Knitted Socks and Stockings.

Prizes from 2s. to 7s. are offered for the best-made and best-shaped Garments, in Plain Needlework.

One Prize of 5s. and two of 2s. 6d. are offered for Darning on Table Linen.

One Prize of 5s. and two of 2s. 6d. are offered for Plain and Swiss Darning of holes in Socks and Stockings.

One Prize of 5s. and one of 2s. 6d. for the neatest mending or patching.

Mrs. F. R. HOLE offers a prize of 5s. for the best specimen of Netting.

Art Needlework & British Lace.

Medals & Prizes are offered by the Society in the following subjects :

1. Original Specimens of Art Needlework in South Kensington Embroidery.

2. Specimens of Art Needlework, not original.

3. Specimens of British Lace.

Note.—All work for Competition must be done by the Exhibitor.

THE JUDGING in all departments of the Exhibition will take place on MONDAY, AUGUST 11th.

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REPORTS

Are much wanted by the Society:—

FIFTH YEAR	[illegible]
NINETEENTH YEAR	[illegible]
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◆

Members may obtain copies of all the other Reports to complete their sets at 1s. each.

THE SOCIETY EXCHANGES ITS PUBLICATIONS with the following Societies and Institutions:—

Bristol Naturalists' Society.
Chemical Society.
Geologists' Association, London.
Historical Society of Lancashire and Cheshire.
Institution of Mechanical Engineers.
Literary and Philosophical Society of Manchester.
Liverpool Polytechnic Society.
Miners' Association of Cornwall and Devon.
North of England Institute of Mining and Mechanical Engineers.
Philosophical Society of Glasgow.
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Plymouth Institution.
Royal Society.
yal Dublin Society.
Greenwich Observatory.
Royal Edinburgh Observatory.

Royal Geological Society of Cornwall.
Royal Geological [illegible]
Royal Institution of [illegible]
Royal Institution of Cornwall.
The Society of Arts.
&c., &c., &c.

American Geographical Society.
American Journal of Science.
American Philosophical Society.
Astor Library, New York.
Essex Institute.
Franklin Institute.
Geographical Society of New York.
New York Lyceum of Natural History.
Smithsonian Institute.
The United States Hydrographic Bureau.
United States Patent Office.
Wagner Free Institute of Science.
&c., &c., &c.

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FIFTY-SECOND
ANNUAL REPORT

OF THE

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1884. 1884.

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Royal Cornwall Polytechnic Society.

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List of Presents to the Library.
1884.

American Geographical Society.—Bulletin, 1883-4.

American Philosophical Society.—Proceedings, 1883-4.

Annual Report of the Chief Signal Officer.—U. S. Government, 1882.

Annual Report of the Surgeon-General.—U. S. Army, 1884.

Astor Library.—Annual Report, 1883.

Barometric Manual for the Use of Seamen.—From the Meteorological Office.

Bristol Naturalists' Society.—Vol. IV., Pt. II.

Chemical Society.—Journal, 1884.

Diurnal Birds of Prey.—By J. H. Gurney, from the Author.

Diurnal Range of Rainfall at the Seven Observatories.—1871-80, from the Meteorological Office.

Essex Institution.—Bulletin, 1882.

Free Public Library, Liverpool.—31st Annual Report.

Greenwich Magnetic and Meteorological Observations, 1882.—From the Astronomer Royal.

Geologists' Association.—Proceedings, 1884, and Annual Report, 1883.

Geological Survey, U.S.
- Annual Report, 1881.
- Mineral Resources of U.S.
- Territories of Wyoming and Idaho, 1878, Pts. 1.2.
- Tertiary History of the Grand Canon district.
- Atlas to accompany ditto.
- Maps and Panoramas, 1878.

Hourly Readings, 1882.—From the Meteorological Office.

Institution of Mechanical Engineers.—Proceedings, 1884.

Kent's Cavern, Literature of; Pt.V., by W. Pengelly, F.R.S., F.G.S. From the Author.

Kent's Cavern and Glacial or pre-glacial Man, by W. Pengelly, F.R.S., F.G.S. From the Author.

Leeds Philosophic and Literary Society.—Annual Report, 1883-4.

Literary and Philosophic Society of Manchester.—Proceedings, 1881-2.

Do. Memoirs.

Liverpool Polytechnic Society.—Annual Report, 1883.

Meteorological Service of the Dominion of Canada.—Report, 1882.

Meteorological Record for 1884.—From the Royal Meteorological Society.

Monthly Weather Report of the Meteorological Office.—1884.

Mining Institute of Cornwall.—Proceedings, 1883.

New York Academy of Sciences.—Annals, Vol. III., Nos. 1-2, Transactions 1882-3.

North of England Institute of Mining and Mechanical Engineers. Transactions 1884.

Notes on Slips connected with Devonshire, Pt. VII., by W. Pengelly, F.R.S., F.G.S. From the Author.

Notes on Notices of the Geology and Palæontology of Devonshire, do., do.

Penzance Natural History Society.—Report and Transactions, 1883-4.

Philosophical Society of Glasgow.—Proceedings, 1883-4.

Photographic Society of Great Britain.—Journal & Transactions, 1883.

Plymouth Institution, and Devon and Cornwall Natural History Society.—Vol. VIII., Pt. III.

Quarterly Weather Report of the Meteorological Office.—1876-7.

Royal Institution of Great Britain.—Proceedings, Vol. X., Pt. 3.

Royal Institution of Cornwall.—Journal, Vol. VIII., Pts. 1-2.

Royal Geological Society of Cornwall.—Transactions, Vol. X., Pt. 6.

Royal Dublin Society.—Scientific Proceedings; Transactions, 1883.

Royal Irish Academy.—Proceedings, 1884, and Transactions, 1883-4.

Smithsonian Report.—1882.

Society of Arts.—Journal, 1884, and Index, 1872-82.

Annual General Meeting.

The Fifty-Second Annual General Meeting of the Royal Cornwall Polytechnic Society was held at the Polytechnic Hall, Falmouth, on Thursday, February 12th, 1885, Mr. Harry Tilly —one of the Vice-Presidents—in the chair. Amongst those present were Mr. Howard Fox, Vice-President; Rev. Canon Rogers, M.A., Rev: William Rogers, M.A., Rev. F. R. Hole, M.A., Rev. C. R. Gardner; Messrs. Henry M. Jeffery, M.A., F.R.S., John Stephens, W. M. Grylls, Wilson L. Fox, F. R. Met. Soc., R. N. Rogers, George H. Fox, S. Bennetts, Nicholas Sara, John Gill, Thos. R. Olver, and E. Kitto, F. R. Met. Soc., Secretary. The ladies present included Mrs. J. J. Rogers, Mrs. F. R. Hole, Mrs. Howard Fox, Mrs. R. M. Tweedy, Mrs. Clift, Miss Fox, Miss M. Tregelles, Miss A. Tregelles, and Miss Dash.

Letters apologising for non-attendance were received from the President, the Earl of Mount Edgcumbe, Lieut.-Col. Tremayne, Dr. C. Le Neve Foster, F.G.S., and Mr. Robert Fox.

The SECRETARY (Mr. E. Kitto) read the minutes of the last Annual General Meeting, which were confirmed and signed by the Chairman.

The Report of the General Committee, for the year 1884 was read.

The CHAIRMAN proposed the adoption of the Report, and Mr. HOWARD FOX, in seconding, said he thought the Report a very full and admirable one. He wished to avail himself of that opportunity to express his sense of the very great loss the county had sustained in the death of Dr. Barham, of Truro. That gentleman's example was one which the younger members of the various societies with which Dr. Barham was connected might well follow.

Dr. Barham's splendid tenacity of purpose under great discouragement was quite unexampled. It was through him that the Truro Public Rooms were built, and no doubt if he had lived his suggestion to have the Royal Institution Rooms at Truro enlarged, and to purchase the freehold, would soon have been carried to a successful issue. As a member of the Polytechnic, he thought they owed the late Dr. Barham a great debt of gratitude, and it was a melancholy pleasure to have that opportunity of expressing regret at the loss they had sustained.

Mr. H. M. JEFFERY asked what steps were proposed to be taken in reference to the deficit in the New Observatory Fund.

The CHAIRMAN replied that they hoped to get rid of the deficit ultimately by donations or subscriptions, but in the meantime they had arranged with their bankers for a temporary loan which would enable them to complete the building. They would be very glad to receive suggestions from members as to any means that might be adopted for obtaining subscriptions.

Mr. JEFFERY said his only desire in calling attention to the matter was that it might be kept fresh in their own minds and before the public.

Mr. HOWARD FOX agreed with the last speaker. He thought they ought to strike pretty soon, but if the subscribers doubled their subscriptions, as had been proposed, there would be an end of the difficulty.

Mr. W. M. GRYLLS suggested that if they had a formal opening of the New Observatory, similar to the ceremony performed at the laying of the foundation stone, they might have as good results as attended that occasion.

In reply to Mr. STEPHENS, the CHAIRMAN said that about £700 was required for the completion of the Observatory.

The SECRETARY stated that the total outlay would be about £1,300, towards which the sum of £670 had been promised up to the present time.

Mr. **Jeffery** suggested that another application should be made to the lord of the manor to show some liberality and generosity towards that valuable but struggling Institution, in connection with the Observatory. They knew his lordship headed the list with a donation of £30, but he thought it might be brought in a judicious way to him that they would be grateful for further assistance. As lord of the manor he might recognise that claim upon his consideration.

The Report was then adopted.

On the motion of Mr. W. M. **Grylls**, seconded by Mr. H. M. **Jeffery**, the following gentlemen were elected vice-presidents: Messrs. T. Bedford Bolitho (High Sheriff,) C. Davies Gilbert, E. Backhouse, and W. L. Fox, F. R. Met. Soc.

The **Secretary** read the Statement of Accounts.

Mr. **Grylls** remarked that it appeared a large extra expense was incurred by the Society in hiring a hall for the mechanical exhibits. Was it not practicable to add to the Polytechnic premises, so that the extra charge might be avoided in the future?

The **Chairman** said there was no doubt that their confined space had been against them for years, and was felt especially in connection with the exhibition of the Mechanical Section. It was an old difficulty—that of "ways and means"—with the Polytechnic as it was with most similar institutions. Their means were very contracted. They had, however, within the past year, made arrangements for purchasing one side of the front of that building for £400, and there was a possibility of purchasing the other half if thought desirable. It was a large additional sum to raise, and perhaps it might not be thought advisable to make a further heavy expenditure at present.

Mr. **Olver** asked whether there was a possibility of the clause in connection with the Society prohibiting the letting the Polytechnic Hall for dramatic entertainments being removed. Owing to the existing prohibition a great source of income was drafted away, and their revenue would be much improved were that restriction removed.

The Accounts were received and adopted.

Mr. W. L. Fox submitted the Report of the Meteorological Committee, which, on the motion of Mr. T. R. OLVER, seconded by the Rev. Canon ROGERS, was adopted.

The Report of the Art Union of Cornwall and Statement of Accounts for 1884 were read.

On the motion of the CHAIRMAN, the Report was adopted, and a cordial vote of thanks was tendered Mr. W. W. J. Sharpe for his important services as Honorary Secretary of the Art Union.

The General Committee for the various districts were elected. The name of Mr. Michael Henry Williams was added to the list for the Truro district.

The SECRETARY read a letter from Mr. J. P. Bennetts, stating that it was not probable he should ever be able to attend another Meeting of the Committee, and asking to have his name removed. General regret was expressed at Mr. Bennetts's retirement through ill health; and the following resolution was unanimously passed, a copy of which the Secretary was requested to forward to that gentleman. "Resolved—that this Meeting desires to place on record the valuable services which Mr. Bennetts has rendered to the R. C. Polytechnic Society—as a member of the General Committee for nearly 30 years, of the Finance Committee for 18 years, and of the Meteorological Committee from its formation. He acted several times as Chairman of the Mechanical Judges, and always rendered great assistance in various other ways. That the Secretary convey to Mr. Bennetts an expression of the deep regret of this Society at the cause of his retirement, and their hope that his name may long continue to be associated with the Society, in which he has taken such active interest."

Mr. George Hart Taylor having written asking to have his name removed from the list of members, as he was about to leave the country, it was proposed by the CHAIRMAN, seconded by Canon ROGERS, and unanimously resolved—That the Secretary write to Mr. Taylor, expressing the regret felt by the Society at his removing from the neighbourhood, and the appreciation of the Meeting of the valuable services he has rendered to the Society, especially in connection with the Fine Art Department at the Annual Exhibitions, for which they tender him their hearty thanks.

The SECRETARY reported that a few members of the Society had expressed their intention to withdraw their subscriptions. He hoped that every effort would be made to induce new members to join the Society, to make up for the old friends it was gradually losing by deaths, removals, and other causes.

Names of several persons in the county were suggested, who, it was thought, would become subscribers to the Society if they knew such to be the wish of that Meeting, and the Secretary was requested to write inviting their co-operation.

Reference was made to the date of the next Annual Exhibition, and it was agreed that the matter be referred to the General Committee for settlement, with whom was left also the consideration of a suggested joint Mechanical Exhibition, with the amalgamated Societies of the Miners' Association and the Mining Institute of Cornwall.

On the proposition of the CHAIRMAN, the best thanks of the Society were given to Mr. F. M. Harris for superintending the Gas department of the last Exhibition; to Messrs. F. C. Lane,

C. Napier Hemy, and others, for loans of paintings; to the Hanging Committee of the Fine Art department; to Mr. T. J. Thuell, and those ladies and gentlemen who kindly assisted him in the musical entertainments during the exhibition; to those gentlemen who gave lectures and addresses; to the Judges in the various departments; and to the donors of books, &c., to the library.

A unanimous vote of thanks to the Chairman for presiding concluded the Meeting.

Report of the General Committee for the Year 1884.

In presenting their 52nd Annual Report to the Members of the Polytechnic Society, your Committee have to state that the year 1884 has been one of continued activity, and of fair prosperity, and they have again the satisfaction to record the widespread interest manifested in the Society's operations.

At the last Annual General Meeting, acting on a suggestion from Mr. Nathaniel Fox, you requested your Committee to consider whether the Society could not in some special manner commemorate at the Annual Exhibition of 1884 the centenary of Murdoch, the Engineer, who first tried a model of his steam engine on the roads at Redruth in 1784, and who, whilst residing at that place, was the first inventor of coal gas as an illuminant.

A Sub-Committee was appointed accordingly to revise the Mechanical Department of the Prize List with special reference to this object. Careful attention was given to the matter by that Committee, who prepared a special section for "Gas" in the Prize List, wherein contributions were invited of Models, Diagrams, Apparatus, &c., and several medals offered for specific objects.

In response to this invitation given to inventors, manufacturers, and others, a large number of specimens of gas lighting and heating apparatus, and of models illustrating various processes of gas manufacture was brought together, forming a collection at once interesting and instructive, as illustrating the wide application of gas to public and domestic requirements, and the high standard of excellence attained in combining proficiency in lighting and heating with strict economy in consumption of gas.

In order to provide proper facilities and ample space for the display of these objects, and for heavy machinery which it was desired to show in motion, it was found necessary to engage the Volunteer Drill Hall, which, during the Exhibition week, was lighted nightly by a Patent "Taj" Gas Lamp, sent by Messrs. W. Sugg and Co.; this was suspended from the roof, and shed a brilliant and evenly-diffused light all over the large Hall, giving it a very effective appearance.

The exhibitors of Gas Appliances included Messrs. Cowan, Sugg, Wright, Willey, West, Arden Hill and Co., and others; amongst the exhibitors of Steam Machinery were Messrs. Ashmore and While, Hathorn and Co., C. H. Rosher, W. Sisson, Hathorn, Davey and Co., and several others, whilst Rock Drills were shewn in competition by many of the leading makers and patentees of boring machinery. The Drills were tested on a large block of granite, which, together with steam power, was provided by the Society. Compressed air for driving the Drills was taken from Messrs. Hathorn and Co.'s "Reliance" Air Compressor, which was kindly lent for the purpose. The Society is indebted to that firm for facilities given on this and on former occasions for the competitive trials of rock borers.

Your thanks are due to Mr. F. M. Harris, manager of the Falmouth Gas Works, for his kindness in making the necessary arrangements at the Drill Hall for the display of the Gas exhibits in working order, for constant personal superintendence, and for the preparation of an exhaustive report on that department, in which he, together with Messrs. N. Fox, H. S. Mackenzie, and W. Sisson, kindly acted as Judges at the request of your Committee.

The Mechanical Department was also represented at the Polytechnic Hall by the usual variety of models, drawings, &c. Special mention should be made of a large and admirable model of the open cast of the south lode of the celebrated Rio Tinto

Mine in Spain, accurately made to scale by Mr. C. N. Thwaite, of London, and lent by the Rio Tinto Mining Co.

The Fine Art department of the Exhibition was enriched by a number of water colour and other drawings of rare merit, from South Kensington Museum, by examples of David Cox, W. Muller, and Sir D. Wilkie, contributed by Mr. F. C. Lane, and by a portion of a series of Cornish Drawings, made for the English Illustrated Magazine, lent by Mr. C. Napier Hemy.

It is pleasing to note that the value of the pictures sold from the Exhibition through your Secretary was greater than for many years past. The chief inducement to artists to send their works to the Exhibition is the chance of sale, which is to some extent secured by the Art Union Drawing. It is gratifying to see that so many patrons of Art have made the Polytechnic Exhibition the channel through which to make their purchases—thus encouraging artists to contribute to the Art Gallery, and promoting the interests of the Society.

The departments of Ornamental Art, Photography, Natural History, &c. were fairly represented, and altogether the exhibition of 1884 compared favourably with those of former years.

During the exhibition week two vocal and instrumental Concerts of an attractive character were arranged and given in the Polytechnic Hall, under the direction of Mr. T. J. Thuell, who heartily responded to the invitation of your Committee, and gave his services gratuitously on both occasions.

Mr. Thuell is deserving of your warm thanks for his services, as are also those ladies and gentlemen who kindly assisted him on those occasions.

Lectures and Addresses were given by Rev. W. Iago, B.A., Mr. W. Marriott, Assist. Sec. to the Royal Meteorological Society, and Mr. R. D. Roberts, M.A.

The Annual Meeting of the Miners' Association of Cornwall and Devon was as usual held at the Polytechnic Hall during the Exhibition. This association has recently been amalgamated with the Mining Institute of Cornwall, and it is hoped that they will show their sympathy with the Polytechnic Society by holding their Annual Meetings within our walls, as the Miners' Association has done from its formation to the present time.

The Annual Drawing for Prizes in the Art Union of Cornwall took place on Friday, August 15th, a report of which is presented by Mr. W. W. J. Sharpe, to whom you are indebted for continuing to discharge the duties of Honorary Secretary in a very satisfactory manner.

The necessity at times, as on this occasion, of engaging a second Hall for exhibition purposes, at a considerable distance from the Polytechnic, entails considerable additional expenditure, whilst the impression on the minds of visitors can never be so favourable as when an entire collection can be brought together in one building. Labour and other costs were kept down as much as possible, but the expenditure of the year has exceeded the income, and the Society's credit balance has been proportionally diminished.

During the past year an opportunity has occurred of extending our accommodation, and arrangements have been made with the directors of the Falmouth Savings' Bank for the purchase of their freehold bank premises in front of the Polytechnic Hall, which, when acquired, your Committee are confident can be let to advantage—when not required to be utilized by the Society for the Annual Exhibitions. Possession of these premises will not be taken until the Savings' Bank Authorities have provided new quarters for themselves.

A list of presents of books, &c., to the Library during the past year is laid before you.

Your Committee, in their last Annual Report, submitted to you particulars respecting a proposal made by the Meteorological Office to discontinue their annual grant for the maintenance of the Falmouth Observatory, and the strong efforts which had been made to retain a first-class Observatory at this place. The Report was carried on to the stage where Mr. R. H. Scott, the Secretary to the Meteorological Council, came to inspect the available sites for a New Observatory Building.

On the 20th February last Mr. Scott wrote, saying that the Council approved of the site near Belmont, as the most suitable for the proposed New Observatory.

Your Committee, acting on the resolution passed at the Annual General Meeting, held on 14th February last, accepted Lord Kimberley's terms for the purchase of the fee simple of the necessary land on the site approved, and prepared and forwarded a circular to all friends of the Society, for the purpose of soliciting their aid towards raising the purchase money of the site selected, and the cost of erecting the New Observatory—setting forth the conditions on which the Meteorological Office would continue their annual grant; an offer of the Royal Society, with regard to the establishment of regular magnetic observations; and the financial requirements for carrying out the whole scheme.

In the meantime the Meteorological Council were furnished with ordnance maps, plan of site, &c., and Messrs. Tilly & Fox were instructed to carry out the purchase of the site on behalf of this Society. Careful calculations were made of the accommodation necessary both for Observatory purposes and for a dwelling for the Observer; rough plans were prepared by Mr. W. L. Fox and your Secretary, and submitted to Mr. G. M. Whipple, B. Sc., the Superintendent at Kew, who made some valuable suggestions, and gave other kind assistance. Subsequently Mr. J. A. Tregelles of London, architect, was requested to prepare plans for a good substantial building, together with specification and form of contract, which were in due course submitted to the Society. Mr. W. L. Fox and your Secretary then made a most thorough examination of them, with a view to combine every necessary accommodation with strict economy of cost, after which they were adopted by the Observatory Committee and forwarded to the Meteorological Council for approval, and were finally adopted.

Tenders for the erection of the building in accordance with these plans and specifications were next invited by public advertisement, in response to which six estimates were sent in. That of Messrs. Olver & Sons, Falmouth, was finally accepted, and the contract signed by them and by your Secretary on behalf of this Society on the 29th July last, the whole of the work to be completed by the end of April, 1885.

Up to this time many kind responses to the circular inviting pecuniary aid had been received, the donations promised amounting to about £450.

The purchase of the site from Lord Kimberley was then completed, the property being vested in the Trustees of the Polytechnic Society.

The 12th August having been fixed for the opening of the Polytechnic Exhibition, your Committee felt it to be most desirable that the foundation stone of the New Observatory should be publicly laid on that occasion, and so form part of the ceremony of the day. Your President, the Right Hon. Earl of Mount Edgcumbe, was at once communicated with, and invited to perform the ceremony, which his lordship very kindly and willingly consented to do.

Your Committee requested Mr. Robert Fox to make all the necessary arrangements for carrying out the ceremony in a suitable manner, and he most readily undertook this arduous duty.

At four o'clock in the afternoon of August 12th, the foundation stone was laid by the noble Earl in the presence of a large and distinguished company; the proceedings throughout were of a most pleasing and successful character, and resulted in an addition of over £60 to the building fund.

The ability and completeness with which Mr. Robert Fox carried out the onerous duties imposed upon him in making all the arrangements for the ceremony, and the energy with which he followed up that day's proceedings by further and special appeals for funds, raising the amount, which on 12th August was £450, to £600 by the end of that month, demand your warmest recognition.

Reference should be made to the handsome granite foundation stone, beautifully polished and inscribed, which was the voluntary gift of Messrs. John Freeman & Sons, who have always been warm friends of the Polytechnic Society.

A full and accurate summary of the proceedings at the laying of the foundation stone appeared in the *Falmouth Packet* on the 16th August, prepared by Mr. Robert Fox; this will also be printed in the Society's Annual Report now in the press, together with a list of donations to the building fund to the end of 1884, amounting to £668, the greater part of which has been received. The total cost of the freehold site and enclosure, together with the Observatory buildings, will be about £1,300. The new building has progressed most steady and satisfactorily from August last to the present time, and will in all probability be quite completed by the time stipulated in the contract.

The Observatory Committee have held many meetings throughout the past year to consider all matters relating to the New Observatory.

A Building Committee, consisting of Mr. H. Tilly, Mr. W. L. Fox, and your Secretary, together with Mr. W. May, of Pool,

—who was appointed clerk of the works—have carefully watched the progress of the building, paying periodical visits of inspection, and being constantly engaged in settling the numerous details and questions which have arisen almost daily as the works proceed.

The past year has brought to the Society's assistance many kind friends—but it has also removed from our midst some of those whose names have been associated with us for very many years, and who have always given their active support.

Amongst the latter we have lost a very old and tried friend in the person of Dr. Barham, of Truro, one of our earliest members, and during several years a Vice-President. He to the last frequently attended the meetings of your Committee, who cordially appreciated his presence, and invariably found his thoughtful words and wise counsels of material assistance. His interest in the Society's work, especially in the Meterological department, was most constant; and in him the science of Meteorology has lost one of its oldest and most patient observers in the County of Cornwall, as well as an able exponent.

Two lady members whose names have been familiar to the Society have also passed away, viz:—Mrs. Williams, of Caerhays Castle, and Miss Fenwick, of Falmouth. Mrs. Williams was a generous annual subscriber, and gave substantial donations to both the Jubilee Fund and the New Observatory.

On the occasion of the lamented death of His Royal Highness Prince Leopold, Duke of Albany, K.G., a letter of condolence with Her Most Gracious Majesty the Queen, your Royal Patroness, and the rest of the Royal Family, was presented to the Queen on your behalf.

Her Majesty was pleased to accept the same very graciously, and to tender her acknowledgments through the Home Secretary.

Both these letters will appear in the Annual Report.

By your rules four of the Vice-presidents retire this day in rotation, and are not eligible for re-election, viz: Dr. Jago, F.R.S., Sir John St. Aubyn, Bart., M.P., Lieut. Col. Tremayne, and Mr. Howard Fox.

It will be your duty to elect four others to fill their places, and your Committee recommend the names of Mr. T. Bedford Bolitho, High Sheriff of Cornwall, Mr. C. Davies Gilbert, Mr. E. Backhouse, and Mr. W. L. Fox, your Meteorological Hon. Secretary.

Report of the Meteorological Committee for the Year 1884.

Your Committee are pleased to report that the work of the Observatory has been carried on as usual. The photographic and other curves, tabulations, registers, observations, &c., have been forwarded every week to the Meteorological Office. A weekly weather table has been supplied to the *Falmouth News Slip* and *Western Daily Mercury* newspapers.

The Climatological Station at Carmino was inspected by Mr. William Marriott, the Assistant Secretary of the Meteorological Society, on the 13th day of August last, and was found to be in satisfactory order. He took two photographs for the purpose of showing the exposure and position of the screen, and of its thermometers. The Observations are taken daily at 9 a.m. local time, and at the end of every month a summary is prepared and forwarded to the Meteorological Society's Office, 30, Great George Street, Westminster. This, after being checked, is published quarterly by that Society with the returns from their other stations (86 in all) in the *Meteorological Record*, which has a considerable circulation. These data, obtained from all parts of England, Wales, and Ireland, and Guernsey, form an authoritative record of the climate of the respective places, and there is reason to believe medical men and others more and more consult them as their fulness and accuracy become appreciated. The popularity which Falmouth is gaining as a health resort is to a large extent due to its equable and genial climate being made known through this and similar channels. One of the pleasing features which has been referred to respecting this locality, is the fact that the amount of Sunshine which is experienced, (daily records being taken at the Observatory by the Sunshine Recorder, the property of the Meteorological Council,) is in excess of almost every other part of England.

In illustration of the use for scientific purposes of self-recording instruments, it is worthy of notice that between the 27th and 31st of August, 1883, a series of barometric disturbances were recorded at the following places, viz:—St. Petersburg, Brussels, Paris, Geldeston, Greenwich, Kew, Oxford, Aberdeen, Stonyhurst, Liverpool, Glasgow, Falmouth, Armagh, Coimbra, Valencia, and Toronto. The form and time of occurrence so closely corresponded, (allowing for the differences in Longitude,) that it would seem they were caused by the Krakatoa eruption in the Straits of Sunda. One disturbance or air wave appears to have travelled round the world in a Westerly direction, and another in an Easterly.

The Meteorological Tables for West Cornwall and the Scilly Islânds, which are prepared by Mr. Kitto, and printed in the Society's Annual Report, will this year appear as usual, together with other Tables relating to the Sea Temperature, Bright Sunshine, Rainband, and Climate of Falmouth, and Notes by your Committee's Honorary Secretary. During the year information has been furnished gratuitously on the Climate and Rainfall to several applicants.

The Sea Temperatures, which have been taken on board one of the Falmouth Steam Tugs for so many years past, have been continued throughout 1884, with the exception of the month of January.

The Rainband Observations, begun in September, 1883, by your Committee's Honorary Secretary, have been regularly taken by him during the year.

Mr. Gill has continued his daily observations at Helston throughout the year, except during the month of February, when the observer's ill-health and other circumstances interfered with their being taken. The Committee are pleased to have this opportunity of tendering him their thanks for the voluntary labour and time he has bestowed upon this work in the interests of Meteorological Science.

The Meteorological Council having decided to provide an iron column for the Anemometer at the New Observatory instead of fixing a wooden staging as used at present, the instrument has been sent to Mr. Munro, of London, to be repaired, and no Wind Records have consequently been taken since the 5th December.

The proceedings taken in selecting and purchasing a site for the New Observatory, the subsequent preparation of plans and specifications for the building, the supervision of its erection, as well as the efforts made to procure the necessary funds, have been so fully reported by the Observatory Committee, under whose directions the whole proceedings have been carried out, that no further allusion need be made thereto.

Your Committee have, in accordance with your instructions, arranged for the necessary accommodation for a set of Magnetographs in the New Observatory. A capacious under-ground chamber, well ventilated and suitably lighted, has been provided, and special precautions have been taken to insure its freedom from damp, and from the disturbing influence of iron.

Your Committee are taking steps to procure the necessary instruments.

WILSON L. FOX,

HON. SECRETARY.

Letter of Condolence to the Queen.

The following is a copy of the letter of condolence with Her Majesty the Queen and the Royal Family, on the occasion of the death of His Royal Highness Prince Leopold, which was forwarded to the Queen; and of Her Majesty's reply:—

FALMOUTH, 7TH APRIL, 1884.

TO THE QUEEN'S MOST EXCELLENT MAJESTY.

MADAM,

We, the Committee of the Royal Cornwall Polytechnic Society, in meeting assembled, desire to approach your Majesty, our Royal Patroness, to express the deep sorrow and sincere regret felt by this Society at the painful intelligence of the death of His Royal Highness, Prince Leopold, Duke of Albany.

The sad event is peculiarly touching to us, in that this Society is endeavouring in its own humble way to encourage Science, Art, and Industry, which His Royal Highness did so much to promote throughout the Nation, and for the encouragement of which his exalted position and personal attainments so well fitted him.

We humbly beg your Majesty for yourself, the Duchess of Albany, and the rest of the Royal Family, to accept our heartfelt sympathy in the sad affliction with which you have been visited, and our earnest prayer that the Almighty will sustain and comfort you in your sore bereavement.

We are, Madam,

Your Majesty's most loyal and dutiful subjects,

(Signed,) MOUNT EDGCUMBE,

President.

HER MAJESTY'S REPLY.

WHITEHALL, 5TH MAY, 1884.

MY LORD,

I have had the honour to lay before the Queen the loyal and dutiful Address of the Committee of the Royal Cornwall Polytechnic Society, on the occasion of the death of His Royal Highness Prince Leopold, the Duke of Albany, K.G.

And I have the satisfaction to inform your Lordship that Her Majesty was pleased to accept the Address very graciously.

I am,
My Lord,
Your Lordship's Obedient Servant,
W. V. HARCOURT.

Rt. Hon. Earl Mount Edgcumbe,
President of
The Royal Cornwall
Polytechnic Society,
Falmouth.

THE FIFTY-SECOND EXHIBITION

Of the Royal Cornwall Polytechnic Society, opened on Tuesday, August 12th, 1884. In order to celebrate the centenary of William Murdoch, who made his discovery of the application of coal gas as an illuminant, while resident at Redruth, manufacturers and others concerned in the field of enterprise presented by gas lighting and warming, which has grown, of late years more especially, to such vast proportions, were invited to contribute by models, diagrams, and apparatus, to an historical collection and general exhibition, with special reference to the production and use of gas. To accommodate the numerous exhibits under this head, the Drill Hall had been engaged, and there also were placed the drills, compressors, pumps, and heavier articles of machinery—especially those which were shown in work. Notwithstanding this, however, the Polytechnic Hall itself was well filled, and presented a very attractive appearance, the most being made of the numerous objects exhibited of an ornamental character. The pictures in the gallery made a capital show, the effect of which was greatly enhanced by a number of loans, most prominent among which was a large and valuable collection of oil paintings, water colour drawings, and etchings, from South Kensington.

INAUGURAL PROCEEDINGS.

The Earl of Mount Edgcumbe, the President, occupied the Chair, and the company included Sir John St. Aubyn, M.P., Mr. T. Bedford Bolitho, High Sheriff, Major Gen. Fitzgerald, Mr. T. S. Bolitho, Mr. Jonathan Rashleigh, Mr. W. C. Pendarves, Mr. E. Beauchamp Beauchamp, Capt. Bridges, Lt. Col. Carlyon, Mr. E. St. Aubyn, Mr. M. H. Williams, Mr. C. Davies Gilbert, the Revs. Canon Phillpotts, W. Iago, (Bodmin), J. Mayne,

A. H. Malan, (Perranarworthal), C. W. Carlyon, (St. Just-in-Roseland), F. R. Hole, (Constantine), W. Rogers, (Mawnan), G. T. Bull, (Treslothan), and C. R. Gardner, (Congregationalist, Falmouth), Dr. Jago, F.R.S., Dr. Barham, F.Met.S., Dr. Bullmore, Dr. Harris, Messrs. J. C. Kennerley, W. M. Grylls, W. Pengelly, F.R.S., H. M. Jeffery, F.R.S., Piers St. Aubyn, S. Bennetts, F. J. Bowles, S. Broad, E. Bullmore, G. Lanyon, N. Sara, G. H. Eustice, H. Liddicoat, (Mayor), Robert Fox, Howard Fox, A. L. Fox, W. L. Fox, G. H. Fox, N. Fox, G. C. Fox, F. E. Fox, W. J. Genn, W. J. Boase Smith, W. Marriott, G. Taylor, C. Davidson, D. W. Bain, Slade Olver, H. U. Broad, W. R. T. Pender, J. Kinsman, E. Cuttance, L. Haslope, R. M. Tweedy, J. B. Read, W. Spargo, W. Hooper, J. Pool, A. Willmore, H. S. McKenzie, W. N. Carne, J. D. Sheriff, (Truro), T. Webber, R. Carter, Harry Tilly, J. Haye, W. Teague, jun., G. H. Taylor, J. J. Beringer, J. H. Collins, F.G.S., F. W. Michell, John Jose, R. N. Worth, F.G.S., (curator), Edward Kitto, F.Met.S. (secretary), W. Lidgey, J. Bryant, W. Tregaskis, and a numerous company of ladies.

The PRESIDENT, in his opening remarks, said he believed they would forgive him if he spoke in a formal manner. They had not come there to hear any lengthened observations from a person who had only just arrived, and who had hardly had time to look over the exhibits; they had come there to see an exhibition of a peculiar character, which Falmouth had made its own, and of which the town and the county had every reason to be proud. (Applause.) It was an exhibition partly practical and partly artistic. With regard to that portion which was practical, he believed they would find in the Drill Hall an interesting series of apparatus for lighting and heating by gas, ever since it was first adapted to those purposes by Murdoch, who was born just 100 years ago. This part of the exhibition had been arranged as a centenary memorial to Murdoch—(applause)—who at one time resided at Redruth, where he acted as the Cornish agent of

James Watt. He was the practical inventor of the application of gas to lighting and heating purposes, the first house so lit being his own, and the first works the Soho Works at Birmingham, which belonged to Boulton and Watt. There were, he believed, no exhibits showing the more recent use of gas as a motive power, but there were practical and mechanical apparatus in the form of rock drills and pumps, which—especially the rock drills—had been found so necessary in increasing the pecuniary returns of our mines, which had to be considered now-a-days to the last farthing.

When they last met there was a great deal of talk with reference to a still more important matter, viz., the safety of those who worked in the mines, and a great deal was said about the models of the safety skips which were exhibited last year. In spite of the interest then shown, nothing further appeared to have been done, and on that occasion they had only one exhibit of the kind, the model exhibited by Capt. W. Teague, jun. What the cause of this was one could hardly tell, unless it was, as Mr. Warington Smyth pointed out at the previous exhibition, that all these automatic safety apparatus had risks of their own, especially when great speed was required. In consequence of this risk these safety cages had been generally given up in the northern mines. So as the mines in Cornwall became deeper, they involved a greater speed in lowering the men: hence it was probably felt that unless something more perfect than had hitherto been thought of could be devised, careful supervision was a greater safeguard than any automatic apparatus. (Applause.) The art exhibition would be found to be on a par with that of previous years, and it would be unjustifiable on his part to make any comments upon the pictures, which he had only superficially inspected. No one could fail to admire the series of works in black and white by Mr. Napier Hemy—(applause)—and they could not help rejoicing to see that Mr. R. H. Carter had latterly taken to introduce a great feature of interest into his pictures, and that was figures. (Applause.) The examples which they had there on that occasion from Mr. Carter's brush were quite sufficient to make them rejoice at his having introduced this new feature. The photographs, he understood, were equal to former years, both as regarded number and excellence. From the sister county of Devon they had the carved casket of Mr. Harry Hems, which was a fine piece of work; and the exhibits from the Aller Pottery were deserving of special notice, not only because of their merit, but because they were sent, not simply as specimens of workmanship, but in the name of each man who executed each particular piece. (Applause.) Mr. Phillips deserved great credit for having inaugurated that principle, for it was the only one which gave true assistance and help to individual care and skill, and he hoped Mr. Phillips's example would be followed in other cases. (Applause.)

Sir John St. Aubyn, Bart., M.P., said he had been asked to submit a proposition with which he was sure they would all cordially agree, viz., that they should give their best thanks to the Earl of Mount Edgcumbe for his address, and for attending and taking the chair on that occasion. (Applause.) His noble friend had offered an apology for not being prepared to give them a lengthened address, but he did not think his lordship owed them any such apology. (Applause.) His address was perfectly adequate to the purpose, and in these days of inordinate and almost ceaseless speechmaking they ought to feel grateful to any public man who would come amongst them and condense his remarks within a reasonable space, as Lord Mount Edgcumbe had done on that occasion. (Applause.) Every Cornish person knew, and if there were any strangers present Cornish people would soon tell them, that there was no person who took a greater interest in all that concerned his own county than did Lord Mount Edgcumbe. (Applause.) He was ready to show that interest whenever occasion presented itself, and he (Sir John) knew that his lordship had come there that day at great personal inconvenience. They ought therefore to feel deeply thankful to him, and, at the same time, should remember that his labours for the day did not finish with what he had done, for he had undertaken later on to lay the foundation-stone of a building which would be the inauguration of a work that would not only benefit the town, but also the county and the kingdom. (Applause.)

Mr. Jonathan Rashleigh, in seconding the motion, said he was sure he should be expressing the feelings of all present when he said that the vote of thanks was no mere matter of form, for they felt that they had been benefitted by the presence of Lord Mount Edgcumbe. (Applause.) It was always a privilege to be in his presence, for he brought wisdom, discretion, and good judgment to bear upon any duty which he might have to perform.

The resolution having been carried, the inaugural proceedings terminated.

LAYING THE FOUNDATION STONE OF THE NEW OBSERVATORY.

Immediately following the opening of the Exhibition the foundation stone of the new Meteorological Observatory at Falmouth was laid by the Earl of Mount Edgcumbe, in the presence of an assembly of over 400 persons.

Some 18 months previously the Meteorological Council of London had given notice that they intended to maintain only three first-class Observatories in the British Isles, and that the grants to four out of the seven then existing, would cease on the 31st of December, 1883. The three which they decided on continuing to subsidize, were Kew, Valentia, and Aberdeen, but in view of the good work done and the value of the observations, the Council expressed the hope that local efforts would succeed in maintaining the Observatories at the other four stations.

The Meteorological Committee of the Polytechnic Society, which has the local management of the Observatory, made strenuous efforts to retain the Institution in Falmouth, and, after much negotiation, the Meteorological Office agreed to continue their grant of £250 a year, provided a new building were erected on a site approved by them, at some distance from the harbour, so as to be free from the disturbing influences on the wind, which the harbour and its surroundings was supposed to cause.

The Polytechnic Society took the matter up with great zeal and determination, and the result was that matters in connection with the new Observatory had become sufficiently matured to admit of the foundation stone being laid on the Polytechnic opening day. The new building is situated at the top of Killigrew Street, opposite Belmont. It does not take the shape of the present one, with its high octagonal tower, but is built in the form of a villa residence, one portion to be the dwelling house of the superintendent (Mr. E. Kitto, F.R.Met. Soc.) the other to be specially constructed for the reception of the various instruments. The building when completed will have a very handsome appearance, the design and details reflecting great credit on the architect, Mr. J. A. Tregelles. The total cost of the building and site is about £1,300, a considerable portion of which has yet to be raised. The contractors are Messrs. Olver & Sons, the work to be finished in nine months. The apparatus in the present Observatory will be transferred to the new one, and the observations now carried on will be continued without alteration, so that the Falmouth Observatory will still be one of the first-class Observatories of the United Kingdom, under the control of the Meteorological Office. The instruments are a barograph, for recording the changes of the barometer; a thermograph, for recording the variations of both the dry and the wet bulb thermometers; the anemograph, to measure the force and direction of the wind; a sunshine recorder; and a self-registering rain gauge. In addition to these, the Royal Society have made a grant for the purchase of a complete set of magnetographs for recording the declination of the needle, and the force of the magnetic currents. Although these will entail an extra annual expense of £50 a year, the Polytechnic Society has boldly undertaken the responsibility of this work.

Seeing that the great value of magnetic observations depends to a large extent on their being taken simultaneously and continually at stations far removed from one another, and that there is now no first-class magnetic observatory in the British Isles west of Oxford, Falmouth Observatory may be expected to supply valuable additional data to our knowledge of this comparatively little known subject.

The Observatory, as already stated, will be under the superintendence of Mr. E. Kitto, the secretary of the Royal Cornwall Polytechnic Society.

At the ceremony of laying the foundation stone there were on the platform:—The Right Hon. the Earl of Mount Edgcumbe, Lord Lieutenant of the County and President of the Royal Cornwall Polytechnic Society, Sir John St. Aubyn, Bart., M.P., the High Sheriff—Mr. T. Bedford Bolitho, the Ven. the Archdeacon of Cornwall, Rev. Canon Phillpotts, Rev. W. Rogers, M.A., the Rector of Falmouth, Messrs. Thomas S. Bolitho, M. H. Williams, Wm. Pengelly, F.R.S., Wm. Marriott, Assistant Secretary of the Royal Meteorological Society of London, Howard Fox, Vice-President of the Royal Cornwall Polytechnic Society, Capt. Bridges, R.N., H.M.S. "Ganges," Edmund Backhouse, Robert H. Alexander, and Robert Fox. There were also present amongst others: — Lord Raynham, Major-General Aylmer, Major-General Pearse, Lieut.-Col. Carlyon, Captain Reed, R.N., Commander Liddell, R.N., Lieut. Harvey, R.N., Majors Pender, Haye, and Parkyn, Captain Christoe, Revs. S. Phillpotts, C. W. Carlyon, W. Iago, F. R. Hole, J. S. Flynn, J. Holford Scott, G. T. Bull, Jas. Mayne, A. H. Malan, G. Mather, C. R. Gardner, and A. Nicolls, Drs. Barham, Ross, and Harris, the Mayor (Mr. H. Liddicoat) and Corporation of Falmouth, the Chairman (Mr. J. J. Skinner) and members of the Parish Local Board, the Chairman (Mr. Nathaniel Fox) and members of the Falmouth Harbour Board, Messrs Harry Tilly, Vice-President of the Royal Cornwall Polytechnic Society, Wilson L. Fox, F.R.Met.Soc., Hon. Sec. Meteorological Department, Edward Kitto, F.R.Met.Soc., Secretary of the Royal Cornwall Polytechnic Society, R. N. Worth, F.G.S., Curator Royal Cornwall Polytechnic Society, J. Allen Tregelles, Architect of the new Observatory, Thomas R. Olver, Builder of the new Observatory, G. T. Olver, W. Corfield, W. J. Williams, Geo. Hart Taylor, J. K. Kinsman, Robert R. Broad, H. U. Broad, J. de Courcy Hamilton, A. Lloyd Fox, F. E. Fox, B.A., George H. Fox, G. Croker Fox, J. S. Perry, H. M. Jeffery, F.R.S., Fras. Barratt, H. Young Jamieson, Piers St. Aubyn, John Jose, Dr. Sturges, J. C. Kennerley, Bernard Freeman,

G. C. Hockin, H. S. Mackenzie, J. H. Collins, F.G.S., Naylor Carne, W. J. Genn, Samuel Bennetts, J. H. Mitchell, F. W. Michell, Richard Carter, Thomas Webber, Wm. Brooks, W. Boase Smith. Arthur Willmore, William Sisson, Henry Pollard, W. F. Newman, and F. J. Bowles, besides a large number of ladies.

Of the many who expressed an interest in the object, and regret at being unable to attend, the following are some of the names:—

His Grace the Archbishop of Canterbury, His Grace the Duke of Bedford, the Rt. Hon. the Earl of Kimberley, the Rt. Hon. the Earl of Northbrook, the Rt. Hon. Viscount Falmouth, the Lord Bishop of Truro, Lord Robartes, Hon. and Rev. J. T. Boscawen, the Lord Mayor of London, Sir James McGarrel-Hogg, Bart., M.P., Sir Paul W. Molesworth, Bart., Sir W. W. Onslow, Bart., Sir Joseph W. Pease, Bart., M.P., Sir Colman Rashleigh, Bart., Sir Charles Graves Sawle, Bart., Sir Vyell Vyvyan, Bart., Lady Protheroe Smith, Messrs. C. T. D. Acland, M. P., W. Copeland Borlase, M. P., Leonard Courtney, M. P., William Fowler, M.P., D. J. Jenkins, M.P., George Palmer, M.P., W. Molesworth St. Aubyn, M.P., John Tremayne, M.P., A. Pendarves Vivian, M.P., John Walter, M.P., Professor J. Couch Adams, F.R.S., Professor W. Grylls Adams, F.R.S., Messrs. H. J. Atkinson, G. L. Bassett, Montague Bere, Q.C., J. F. Buller, W. Bolitho, jun., A. R. Boucher, William Bolitho, Miss Carne, Messrs. Digby Collins, E. S. Carus Wilson, John Coode, William Coode, Arthur Coode, Mrs. Enys, Messrs. F. G. Enys, Richard Foster, T. Robins Foster, C. LeNeve Foster, D. Sc., F. Galton, F.R.S., C. Davies Gilbert, Rev. James Glencross, Messrs. R. C. Glanville, Robert Hunt, F.R.S., Alfred Lanyon, Professor Norman Lockyer, F.R.S., Mr. W. H. Pole Carew, Rev. Canon Rogers, Messrs. Jonathan Rashleigh, W. Bickford Smith, Geo. J. Smith, Professor Warington Smyth, F.R.S., Rev. St. Aubyn Molesworth St. Aubyn, Lieut.-Col. Edward St. Aubyn, Professor

Stone, F.R.S., Professor Stokes, F.R.S., Professor Balfour Stewart, F.R.S., Mr. George Tangye, Col. Tremayne, Mr. A. C. Willyams, Rev. Canon Wyse, Mrs. W. P. Dymond.

The band of H.M.S. "Ganges" (Mr. G. W. Bishop, bandmaster,) played music at intervals. Mr. Robert Fox ably superintended the conduct of the ceremony.

After prayer had been offered by the Archdeacon of Cornwall, the Ven. W. J. PHILLPOTTS, Sir JOHN ST. AUBYN, Bart., M.P., addressing the Earl of Mount Edgcumbe, said: My Lord,—In the interest of science, and in the name and on behalf of all who are interested in this undertaking, I have the honour to present you with this trowel, and to ask you to lay the first stone of the new Falmouth Observatory—(applause.)

The trowel which was of the most beautiful and tasteful character, was supplied by Mr. N. Fox, and bore the following inscription:—"Presented to the Right Hon. the Earl of Mount Edgcumbe, president of the Royal Cornwall Polytechnic Society, in commemoration of his laying the foundation stone of the Falmouth Observatory, 12th August, 1884."

THE EARL OF MOUNT EDGCUMBE, having accepted the trowel, proceeded to lay the stone. He first placed a bottle containing a copy of that day's issue of the *Western Morning News* and *Western Daily Mercury* and a bronze medal of the Polytechnic Society, in a cavity beneath the stone, after which he duly fixed the stone in its proper place. He then said: I declare this magnificent stone, which was presented to the Observatory by Mr. Freeman, for the purpose of being the memorial stone of the building, well and truly laid and level. (Applause.) The inscription on the stone was as follows:—The Earl of Mount Edgcumbe, president of the Royal Cornwall Polytechnic Society, laid this stone, 12th of August, 1884.—J. A. Tregelles, architect, Olver and Sons, builders.

Mr. Robert Fox then came forward, and on behalf of the Royal Cornwall Polytechnic Society begged to present to his Lordship some of those who had been most actively engaged in the work which the noble Earl had so happily inaugurated that day. He began by introducing Mr. Harry Tilly, chairman of the Building Committee of the Observatory and a vice-president of the Society, a constant attender of the committee meetings and in his Lordship's absence ably presiding over them. Next came Mr. Wilson L. Fox, F.R.Met.Soc., the hon. secretary of the Meteorological Department of the Polytechnic Society, which department he had most efficiently superintended for the last seven years: a great amount of the weight of arranging the details of the specifications with the architect and the builders, had fallen on his shoulders. (Applause.) He next presented Mr. E. Kitto, F.R.Met.Soc., secretary of the Royal Cornwall Polytechnic Society since 1873, and who, since the foundation of the Observatory in 1868, had been respectively assistant observer and observer-in-chief. He thought it not too much to say that the satisfactory carrying out of the meteorological work, and to a great extent the success of the Polytechnic Society of late years, was largely due to his efforts. (Applause.) He then introduced Mr. J. A. Tregelles, the architect, who had done his best to obtain a building thoroughly fitted for the purposes of an observatory, at a moderate outlay. And lastly he presented Mr. T. R. Olver, the builder, a gentleman who had met the committee in a most obliging spirit, and in whom they had every confidence that the work would be well carried out. (Applause.)

The noble Chairman having shaken hands with each of the gentlemen presented, said: Ladies and Gentlemen,—I hope to earn, or at any rate to deserve, your thanks the second time to-day for not detaining you with many words—(applause). But perhaps you may wish me just to say something as to the nature of the Observatory and the circumstances under which the Polytechnic Society has been called upon to erect a new building. In February of last year the Meteorological Council announced its intention of reducing the number of first-class observatories in the United Kingdom from seven to three, and amongst the number to be done away with was this Observatory, which has existed for many years at Falmouth. They were to be reduced by the 31st December, last year. In June of last year a deputation waited upon the Meteorological Council to ask them to reconsider their intentions. That deputation consisted of a number of Cornish gentlemen and Cornish representatives, who placed the case as well as they could before the Council. They were also accompanied by three scientific gentlemen, Professors Couch Adams, F.R.S., Grylls Adams, F.R.S., and Warington Smyth, F.R.S., and the first named made a special report on the subject, which was laid before the Council, pointing out to them the advisability of maintaining a first class observatory in this locality for the sake of the country generally. But perhaps we may be indebted almost more than anything else for the building of this Observatory to the services of the British Association. They appointed a special committee to consider the subject and put themselves in communication with the Meteorological Council, and in November of last year, when the Council met again after its holidays, it determined to continue the grant to this place upon certain terms—(applause). But it was considered that the existing Observatory was not well situated for the purpose, and one of the conditions was that a new building should be erected. It is with this view that the Polytechnic Society determined to use their best endeavours to get the necessary funds to meet the conditions of the Meteorological Council and to erect this Observatory—(applause). I am not a scientific man, but I can, perhaps, point out some few of the objects for which this Observatory will be used. His Lordship here explained the various instruments to be placed in the Observatory and their uses, and, continuing, said: It is difficult, perhaps, for anyone to understand fully how far these observations may be of real general use, but I think everything in these days tends to show how individual records combining to make general statistics are the great source of our information; and I believe not only shall we be doing practical use, but we shall be doing our duty with the gifts God has given us, in endeavouring to add our contingent to the reading of what I may call the second volume of His book of wisdom, that which is especially directed to our intelligence, to our reason, by using our best efforts to observe the book of Nature which He opens for us, not only for our own information, but for the practical good of mankind—(applause). I believe this object has your sympathy, but it will require something more than your sympathy, because funds are much needed for completing the work. £310 has been given for the land upon which we stand, £50 has gone in hedging it around, the estimated cost of the building is over £800. This, with other expenses will bring the total amount required up to £1300 and at present only about £450 has been promised. I must say that although I have no doubt it will be liberally supported, I think it is an object towards which support might be reasonably expected from outside the limits of the county—(applause.) If there is a determination on our part to do what is required from us, I hope we shall receive assistance from scientific bodies, and that there will be nothing to delay the work which we have commenced to-day—(applause.) I believe papers will be sent round to those who wish to promise anything towards the building, and I trust the work we have now begun will go on without fail to completion—(applause.)

Mr. T. Bedford Bolitho, the High Sheriff of Cornwall, said the great pleasure had devolved on him of asking them to accord their thanks to the Lord Lieutenant for the able manner in which he had performed his work that day, and for the very able and interesting address which he had delivered. It seemed to him that Lord Mount Edgcumbe was an apt illustration of the seeming paradox that the more a man had to do the more he was inclined to undertake, and the more able was he to perform the duty. The occasion which had brought them together was certainly a very interesting one. He thought that English people, although eminently devoted to matters of a practical nature, loved to touch the fringe of science in some way or other, and it appeared to him that this Observatory was destined to be a link between science and practice. He thought Falmouth was preeminently fitted for an Observatory of this kind, both on account of its geographical situation and of the scientific people connected with it. Amongst these he included ladies, and he was glad to see present one who had always helped on such good causes, and who, notwithstanding her advanced years, was about to start for Canada, to attend the British Association meeting there. He of course referred to Miss Fox. (Applause.)

Mr. W. PENGELLY, F.R.S., in a facetious speech, seconded the High Sheriff's motion, and pointed out the necessity of science being accurate. He congratulated them on the success of that day's proceedings.

The motion was carried with cheers.

Mr. ROBERT FOX announced that the subscriptions promised that day towards the new Observatory fund amounted to £60, of which his lordship had given £20. (Applause.) This concluded the proceedings.

Judges' Reports.

MECHANICS.

SECTION I. ROCK DRILLS, STEAM ENGINES, BOILERS, AND MACHINERY CONNECTED THEREWITH.

SECTION II. SANITARY AND DOMESTIC INVENTIONS AND IMPROVEMENTS.

SECTION III. GENERAL MECHANICS.

JUDGES:—*Mr. Nathaniel Fox, Chairman; Messrs. E. D. Anderton, G. H. Eustice, F. W. Michell, C.E., H. S. Mackenzie, W. Slade Olver, J. Pool, M.I.M.E., Nicholas Sara, R. H. Williams.*

The Judges of Mechanics have to report the appearance of several interesting and valuable inventions. A first bronze medal is given to the very handy little tool shown by Mr. J. Tyson, for facing flanges, &c. The patent welding cloth of M. Sabatier appears likely to meet a decided want, and is strongly recommended for trial. A local test would be desirable. Mr. Holmes's danger signals are awarded a first bronze medal. M. Poidevin's simple putty scraper is commended. The neat and handy Macrame lace loom has a second bronze medal. Mr. Warwick's highly ingenious new oscillating motion, which embodies a novel application in practical mechanics, has a second silver medal. The beautifully made cast-steel engineer's tools by Mr. D. Lowe, have a first bronze medal for their precision of detail and admirable finish. Mr. Thomas's new water churn has a second bronze medal for its adaptation of power, and the like award is made to Messrs. Lionhardt's free flowing pens. The domestic motor of

Messrs. Hathorn, Davey, and Co., is considered a very simple and excellent arrangement for the safe use of steam power in domestic affairs—pumping and driving small articles of mechanism, and has a second silver medal. A second silver medal is awarded Mr. Thwaite's admirable model of the great open-cast workings at the Rio Tinto mines. Messrs. Beck's visible drop lubricator is an excellent move in the right direction, and has a first bronze medal. The closet disinfecting apparatus of the London Automatic Disinfector Company is recommended for trial. A first bronze medal is given to the rowlocks shown by Mr. E. Robertson. To Capt. White is awarded a special premium of £2 for his cross section of the Wheal Peevor district. Mr. Butlin's "Ombrelluna" is commended as an ingenious novelty. The capital slide valve pump of Messrs. Ashmore and While has a second silver medal. For the new cone joint in Hathorn's hydraulic tunnel bar a first bronze medal has been awarded. The judges recognise the improvements in detail made by this firm in its well-known compressor, but are of opinion that the stroke should be lengthened, and that one steam cylinder of larger area should be used instead of two. Mr. Sisson has a second silver medal for his admirable steam capstan for yachts and trawlers. Mr. Rosher has a first bronze medal for his "Rainbow" water raiser. The judges are glad to see some admirable examples of workmanship, but regret that so much time should have been wasted in producing others of the articles. H. Andrewartha, a deaf and dumb youth, has 10/- for his models; Thomas Rooke is commended for his automatic bench stop; James Williams has 10/- for his models of smith's tools; J. H. Jones 15/-, and W. Francis £1, for model engines. For Mr. Jewell's excellent workmanship in the table of New Zealand woods, shown by Mrs. Enys, a second bronze medal is given to the maker.

In the rock drill competition four machines took part—the "Eclipse," "Climax," "Cornish," and that of Capt. Teague. The judges, however, subsequently received a communication from Messrs. Hathorn and Co., stating that the Teague Patent Rock Drill was a direct infringement of their Eclipse Rock Drill, and having read a copy of Mr. Teague's reply to their claim on him, unanimously decided to exclude the Teague Drill from the contest.

As the result the first silver medal was awarded to the "Climax" drill of Messrs. R. Stephens and Son, the calculation of relative efficiency being as follows :—

Relative efficiency as to Air.

"Climax,"—R. Stephens and Son	2.16
"Cornish,"—Holman Brothers	1.57
"Eclipse,"—Hathorn and Co.	1.456

Relative efficiency as to Time.

"Climax,"	13.54
"Eclipse,"	12.66
"Cornish,"	11.88

The detailed results were calculated by Mr. W. Sisson from data supplied by Mr. F. W. Michell, as follows :—

NAME OF MAKER OR OF DRILL.		TEAGUE	"ECLIPSE"	"CLIMAX"	"CORNISH"
Initial diam. of 1st bit (ins.)	D1	$1\frac{3}{4}$	$2\frac{1}{16}$	$1\frac{3}{4}$	$1\frac{13}{16}$
Final " 1st " "	D2	$1\frac{9}{16}$	2	$1\frac{9}{16}$	$1\frac{3}{4}$
Depth bored by 1st bit (ins.)	H	19	16	19	$16\frac{1}{2}$
Diameter of 2nd bit (ins.)	d	$1\frac{1}{2}$	$1\frac{7}{8}$	$1\frac{1}{2}$	$1\frac{1}{2}$
Depth bored by 2nd bit (ins.)	h	$3\frac{1}{2}$	6	$3\frac{1}{2}$	$6\frac{1}{2}$
Total volume of stone removed in cubic ins.	V	47.4	68.4	47.4	55.6
Total number of revolutions of Compressor.	N	589	839	389	646
Pressure of air above atmosphere.	P	49.5	56	60	56
Total time occupied in actual boring.	t	m. secs. 3 45	5 25	3 30	4 58
$\frac{1000\,V}{P \times N}$ Efficiency in relation to air used.	E a	1.65	1.46	2.14	1.57
$\frac{V}{t}$ Efficiency in relation to time occupied.	E t	12.64	12.61	13.54	11.20
		This Drill disqualified.			

SECTION IV. GAS MANUFACTURE AND APPARATUS—MURDOCH COMMEMORATION.

JUDGES:—*Mr. F. M. Harris, Mr. W. Sisson.*

Some of the sections in this department are but poorly represented, and this fact has rendered it a work of some difficulty to make awards. There are exhibited, however, several decided novelties and improvements in the appliances used in the manufacture and distribution of coal gas. These appliances, with the awards made, will be reviewed in the order of their arrangement in the catalogue.

A Working Model of Machine used in Drawing and Charging Gas Retorts, John Somerville, London, first bronze medal.—This machine is designed with a view to supersede, by mechanical agency, the manual labour now employed in this department of gas manufacture. The exhausting nature of this labour is well known in gas works, and the introduction of machinery that will in any way mitigate this evil will be gladly hailed as a boon. Machinery of this class is now extensively used in large works with satisfactory results.

Regenerating Furnaces for Ground-floor Retort Houses, J. Somerville, highly commended.—The economy of fuel, and considerable reduction of wear and tear, attained by the employment of a regenerative system of firing, as compared with the old system, is leading to its adoption in many works, with most satisfactory results. The general adoption of the system may be considered as only a question of time. The earlier designs for regenerative settings were too complicated for use in small works. That shown by model, has in a considerable measure removed the difficulty, and retort settings similar in arrangement are now in operation at many small works, including those of Truro and Falmouth.

Full size patent Dip Reducer, W. & B. Cowan, London, first bronze medal.—Appliances for attaining the removal of the seal or dip in the hydraulic main are numerous, and some extremely complicated. It is a fact, admitted by those experienced in the subject, that the complete removal of the dip is attended with undesirable results, leading as it does, at times, to the indrawing of furnace gases on the one hand, or loss under certain conditions from returning gas on the other. Both these drawbacks are avoided by the Dip Reducer.

The working can be readily understood. First—and by no means a small consideration—there is an ordinary hydraulic main, and a common dip pipe absolutely unaltered for the purpose of this invention. A flattened hollow cone of thin cast iron with its apex cut off, leaving an aperture one inch in diameter, is provided with a ring, to which it is fastened by rivetted studs, and which fits over the dip-pipe, being secured thereto by a set screw, thus holding the cone in an inverted position below the dip-pipe. The action in working is as follows:—When by the closing of the charged retort with which it is connected, gas begins to come freely down the dip-pipe (which is, of course, sealed in liquor,) the first bubbles of gas blow the small quantity of liquor that stands between the pipe and the cone into spray. This goes on until the gas begins to slacken, when, of course, the liquor gains upon it; until at last, when the retort is spent, the seal stands at the normal dip of the pipe. The success of the working, as tried for some months at the South Metropolitan Company's works, leaves nothing to be desired. It reduces the seal of the dip-pipe, while working, to an equivalent of about 2·10ths; and directly the gas ceases to flow, or the retort is opened, the normal seal of an inch is re-established, and without altering the shape or dimensions of the hydraulic main or dip-pipe, or introducing a single moveable part.

Messrs. W. and B. Cowan also exhibit one of their 3-light Dry Gas Meters in glass case, to enable its construction and finish in workmanship to be more readily seen.

A Three Light (Warner and Cowan's Patent) Wet Meter, with patent compensating drum, is shewn in a glass case, with a similar object in view as to inspection.

A patent Compensating Measuring Drum, as used in the above-named Wet Meter, W. and B. Cowan, first bronze medal.—This invention overcomes a difficulty that has long baffled meter makers. The distinguishing feature in the construction consists in its being perfectly independent of any particular water line, its registration being correct under all possible variations of level, short of the limits of surcharge on the one hand, and exhaustion on the other. This object is attained by means of a small drum revolving with the large drum, but so constructed as to deliver back to the inlet any gas passing beyond the exact measurement.

Model of Cowan's patent Gas Governor, W. and B. Cowan, second silver medal.—Much difficulty has been experienced in obtaining an unvarying outlet pressure with a varying inlet pressure in connection with Station Governors employed at Gas Works. Cowan's Governor attains the object of an unvarying outlet pressure with a varying inlet pressure under all conditions, providing of course, that the initial pressure does not fall below the required outlet pressure. The principle of construction to attain this end, consists of an equilibrium valve specially designed to meet the requirements of a Gas Governor.

Messrs. Cowan also have a Testing Meter with dial divided to indicate fractions of a cubic foot, for special purposes of measurement, and testing Meters, and a Meter Index as used in Wet and Dry Gas Meters.

Sugg's "Taj" Lamp, W. Sugg and Co., London, first silver medal.—Suspended in the centre of the Drill Hall is one of Sugg's 450 candle power Taj Lamps. A combination of burners, clustered, renders the air necessary for combustion highly heated, resulting in a considerable increase of illuminating power in the gas consumed. Opal reflectors, fixed at an angle, form the top of the lamp, and the burners are protected from side draughts by a curtain of clear glass. The combination of burners (with governors to prevent flaring) and reflectors, throws a flood of evenly diffused light over the building, contrasting in a marked degree with the class of suspended lights commonly used in public buildings.

Messrs. Sugg likewise have their patent Lambeth and Victoria Shadowless Lamps, specially designed for street lighting, with the same principle of heated air supply and reflecting surfaces, but rendered storm proof by making no openings in the lamps, other than those actually needed for the supply of air, and for the exit of the products of combustion;—Governor Burners for household use fitted with metallic valves;—and Joslin's patent Indicator, for showing the consumption of gas per hour, without the aid of a meter. The principle involved in construction, is that of a taper glass tube, with a disc valve, and pointer raised in proportion to the quantity passing, thus indicating, on a divided scale, the consumption.

Thomas and Ennor's patent Hydraulic Valves are arranged with hoods or covers, over pipes, sealed in water, the pipes in question communicating with purifiers, station meters, or other apparatus used in gas works. The gas is diverted into the required channels by means of the hoods sealed in water.

[illegible] Patent Anti-Dip, with moveable ascension pipe, James Thomas, second bronze medal.—This arrangement permits the seal to be entirely removed, and affords a ready means of disconnecting the ascension pipe for cleaning, if desired.

Messrs. John Wright and Co., of Birmingham, send a well-arranged stand of their "Eureka" Gas Cooking Stoves, Heating Stoves, [illegible] Gas Bath, Water Heater and Boiling Rings. The finish and workmanship denote considerable care. This firm obtained last year a second silver medal for their "Eureka" Cooking Stoves. This year, a first bronze medal has been awarded for improvements in these Cooking Stoves, consisting of enamelled lining, and swing brackets for shelves. The firm are also awarded a first bronze medal for novelty in design of their Kyrle Heating Stoves; the novelty consists of an arrangement by which pure air is brought from outside, and is warmed in its passage through the stove, and delivered into the apartment perfectly free from smell. The products of combustion are conveyed to a chimney, not entering the apartment. Their Phœnix Heating Stoves are an improvement on the Cosy fires of last year, and are awarded a first bronze medal, having been proved, by testings with a Calorimeter, in competition with stoves of two other makers, to diffuse a greater amount of radiant heat in relation to gas used.

Their Instantaneous Spiral Water Heater is an appliance for delivering a continuous stream of hot water a few moments after the gas is ignited. An important feature is the construction, allowing the whole appliance to be readily taken apart for cleaning; awarded a second silver medal.

Messrs. Arden, Hill, and Co, of Birmingham, send a varied assortment of Gas Cooking and Heating Stoves, Bath, Fire Lighter, and Steamer Washer.

A first bronze medal was awarded to their Bath, on the ground of expeditious heating, its economy in gas used being very nearly equal to that of the other bath tested in competition with it.

A first bronze medal was also awarded to the Patent Steamer Washer.

Messrs. A. J. West and Co. send a Gas Cooking Stove, and Gas Fires in patent metal case, and in ornamental cast iron cases.

Messrs. Willey and Co., of Exeter, send a stand of Gaseliers, Hall Lamps, Bronzes, Brackets, and Steam Fittings. A first bronze medal is awarded to the stand of Gaseliers. The stand also includes Gas Meters in glass cases, Gas Heating Stoves, and Cosy Gas Fire.

In connection with their Wet Meter, a claim of novelty is made for the float arrangement to the valve controlled by the water line. A chamber encloses the valves extending below the water line, but allowing free communication between this chamber and the outer casing. The inlet pressure is prevented from acting directly on the top of the float by being diverted to the side of the casing forming the chamber, and so preventing an increase of pressure depressing the valve and extinguishing the lights.

CHEMISTRY, ELECTRICITY, &c.

JUDGES :—*Messrs. J. J. Beringer, R. J. Frecheville, F.G.S., R. N. Worth, F.G.S.*

The Judges in this department have the satisfaction of reporting the receipt of an essay by Mr. Edward Halse, associate of the Royal School of Mines, which meets the conditions of the special premium of £2 offered by the Society, and £3 by Col. Tremayne, for the most exact account of the phenomena of mineral veins in any mine or district. The area dealt with is that of the Florida main lode, Cardiganshire, and the paper is a very exact and careful description, full of detail, carefully written, of this rather small piece of ground. The Judges would like to see such papers on Cornish districts, and trust this may be the first of a series. The paper is well illustrated.

To the beautiful series of models of crystals and imitation precious stones by Dr. Theodor Schuchardt, Prussia, a first bronze medal is awarded.

The thanks of the Society are due to Mr. A. K. Barnett for his highly interesting series of electric apparatus. The Judges regret the late arrival of several of the exhibits, and particularly that of the very interesting collection of artificial crystals chiefly formed in smelting operations, contributed by Mr. Terrill, Swansea.

FINE ARTS.

SECTION I. AMATEUR OIL PAINTINGS AND WATER COLOURS.

SECTION II. PENCIL, CRAYON, ENGRAVING AND ETCHING, LITHOGRAPHY, &c.,

JUDGES:—*Mr. W. Boase Smith, Mr. G. H. Taylor.*

The Judges are pleased to notice again amongst the oil paintings by amateurs the very good work of Miss Constance Hill,—"Portrait of a Lady," the effect of which is however a little marred by the absence of the hands, which is somewhat awkwardly felt: Miss Hill is disqualified for receiving a medal, having had the first silver last year. "Mistress Madge," Miss Morphew, is highly commended for good drawing—the painting being somewhat weak and undecided. A very good still life study by Miss Wales, in which the general arrangement and colouring is most pleasing and the fruit well painted, is awarded a second silver medal. Lieut.-Col. Carlyon's figure studies show some good work but are faulty in drawing. A second silver medal is awarded to Miss Morphew's "Old Roman Bath" at Bath, for very good drawing and painting. To "Jesmond Dene," Miss Lydia Worth, the Judges award a first bronze medal, but they would wish to see more gradation and atmospheric effect. Mr. J. C. Richards's sketches of trees shew careful observation of nature. It is to be regretted that there are no figure subjects sent in in the water-colour department. The landscapes "Blue and Gold," "Sunshine and Shadow," and "Twilight Spirits," Mr. C. J. Mitchell, are in advance of the other amateur work, and a first silver medal is given for them. The second silver medal is given to Miss Harris's "Ross," in which the very good study of a tree is noticeable. "Plantation Pathway," Mr. F. E. Fox, shows nice clear handling but is somewhat spotty in effect. To Miss Rachel Fox's good study of "Cacti," carefully and correctly drawn and delicately coloured, is awarded a first bronze medal, and to Miss Guppy's "Nasturtiums" a second bronze for harmonious colour and arrangement. Miss Lean's "Frying Pan, Cadgwith," shows some bold drawing on a large scale, but lacks finish and harmonious colour. To Miss Robinson's studies of flowers the Judges award 7/6 for careful study of form.

In the pencil work there are three very careful copies of engravings by Mr. W. C. Bird, which not being original can take no prize.

SCULPTURE, ARCHITECTURE, AND ORNAMENTAL ART.

JUDGES:—*Mrs. Rogers, Mrs. Fitzgerald, Mrs. Genn.*

The following awards are made by the Judges in this department:—Repousse work, Miss Bainbridge, second bronze medal; ditto, Miss K. Shortland, 10s.; Miss Popham would have had an award for "Apple Blossom," had she not been disqualified by taking a similar prize last year; Mr. Legatt's ornamental writing is commended: Mr. W. E. Hill's paper on architecture is commended, and would have had a prize if written specially for the society; "Lincrusta Walton" decoration, first bronze medal; original designs by J. Miller for house decoration, shewn by Messrs. Phillips, second silver medal; painted table, Miss E. Leggoe, first bronze medal; designs for lodges and cottages, Mr. Hill, first bronze medal; terra cotta bust, Mr. G. Burnard, second silver medal; group, Mr. G. A. Burnard, first bronze medal; carved oak coffer, Mr. H. Hems, second silver medal. To the exhibits of the artist workmen at the Aller Pottery the Judges make the following awards:—S. Kirkham and Lewes, first bronze medals; T. Mellor and G. Dart, second bronze medals; W. White, W. F. Young, F. Findley, J. Budd, B. Norris, and E. Gribble, highly commended.

PHOTOGRAPHY.

JUDGES:—*Messrs. R. Fox, W. Naylor Carne, W. Brooks.*

The Judges have great pleasure in announcing to the Society that the exhibits in this department and its sections are fully up to the average, not only as regards numbers, but in the excellence of the exhibits generally. Of late years there has been a falling off in the professional portraiture department—that is, in the large size portraits. The landscapes are exceedingly fine, especially since the introduction of the rapid gelatine plates, and at the present time their manipulation is much better understood than it was a few years since. There are a few specimens of instantaneous work which show merit unattainable until the introduction of the rapid plates. The amateur section is exceedingly well represented. The Judges also beg to call special attention to a series of large photographs of America, which possess great interest not only as photographs but are very interesting in a geological point of view. They have been presented to the Royal Institution of Cornwall by Mr. Richard Pearce, jun., of Denver, U.S.A. In the photographic appliance and magic lantern department several ingenious inventions are to be found.

PROFESSIONAL SECTION.

Mr. H. P. Robinson, of Tunbridge Wells, is well represented by a large series of very fine studies in his well known style. They are most admirable as gems of the photographic art, and each tells its own tale. The expression and gesture of the figures are perfect; the large picture "The Cuckoo" carries off the Society's first silver medal,—the subject is a very difficult one and exceedingly well treated. Mr. W. W. Winter, of Derby, takes also a first silver medal for a portrait study, "Sad Moments," which in the opinion of the Judges is simply perfect in pose and expression. He is also represented by several other charming studies, which fully illustrate the high state of perfection of photographic art at the present day. Mr. W. Gillard, of Gloucester, is again to the front, and has been awarded a first silver medal for his magnificent composition picture "The Miser." The Judges cannot speak too highly in its favour. He has several other exhibits, which are very perfect. Mr. J. H. C. Harrison sends three frames of instantaneous studies printed in carbon, of Shipping, which show careful manipulation. Mr. W. P. Marsh receives a first bronze medal for his frame "High Seas," which represents in a marvellous manner heavy seas breaking over a beach and esplanade. Mr. E. C. Bowker sends a frame of cabinet pictures, some of which are very good, but the Judges think it a mistake to pose one individual so many times. The frame contains upwards of thirty portraits, one-third of them of one lady. Mr. F. Whaley sends some very good studies, the best of which is "This little Pig went to Market." Mr. J. Milman Brown is again represented by several productions; the best is "Autumn Sunshine," and is highly commended. Mr R. Faulkner, of London, shows a frame of very skilful studies of children in his well known style, and also some highly finished vignette studies. The Judges regret that they are unable to award a medal, but highly commend them, owing to the high artistic finish which is put upon the photographs. Mr. J. P. Gibson sends some clever little artistic studies, principally River Scenes. Mr. J. Terras contributes some clever little studies. Mr. A. Hendrey is represented by some studies of flowers and also a river scene, "The First Bite," which is very soft and delicate, and is very highly commended. Mr. John Jackson sends three frames of views, the best of which, No. 696, possesses considerable merit. No. 699, a frame of Interiors of Lincoln Cathedral by Mr. George Hedley, which are well rendered, has been awarded a second silver medal. Mr. P. M. Laws sends a frame of ceramic enamels, well worthy of notice. Mr. Luke Berry sends some very charming pictures, both landscape and figure, and his "Llanberis Pass" has been awarded a second silver medal, being a most artistic production, and full of atmosphere. Messrs. Byrne & Co., of Richmond, send some very fine portrait examples printed in red carbon, but the Judges notice several of the same studies that the firm have exhibited in former years. Mr. G. Renwick sends two interesting large studies of snow and frost scenes, and also a frame of children's portraits of merit. The award for enlargements is a second silver medal to Mr. T. J. Dixon, of London, for a "Tiger." This in the opinion of the Judges is the best enlargement they have ever seen from so small an original. Another by the same exhibitor of an "Eagle" is almost equally good. Mr. G. Honey has a very clever little composition picture, children in a boat feeding swans; it is a great pity the picture is not of larger size.

AMATEUR SECTION.

The Rev. H. B. Hare sends examples of good work of river and wood scenery. Mr. A. Pringle's productions are very perfect, and are fully up to that gentleman's former productions. To his frames No. 805 and 809 has been awarded the first silver medal. They are full of atmosphere, and the artistic treatment is perfection in every way. Mr. A. Miller contributes a very careful figure study. Mr. D. Barnett sends two frames in landscape and rustic studies; they would have been more effective if skies had been printed in. Dr. Martin shows two very good interiors. Mr. A. G. Tagliafero sends four frames, interiors, &c., the best of which, frame 12, has been awarded a second silver medal. The subjects are well treated. Mr. W. J. Grant has been awarded a first bronze medal for his well known Polar subjects. Mr. R. Hopkins sends three large size pictures printed from paper negatives, which appear a little too heavy. Mr. P. H. Emerson contributes one frame of seascapes, instantaneous, which has been awarded a second bronze medal. The same gentleman also sends six very life-like heads in red carbon, which are highly commended.

APPLIANCES, &c.

Mr. G. Atkinson sends a retouching desk, which is no doubt effective. Mr. T. B. Dagley has a plate washing cabinet, which is well adapted for amateurs, and to which has been awarded a second bronze medal. The same contributor also sends a plate-box, so that plates may be examined by the Customs without injury. Mr. R. R. Beard, of Bermondsey, sends a very ingenious self-containing lantern slide carrier to which has been awarded a second bronze medal. He has also a case of so called safety tubes, the workmanship of which is good, but as to their utility in the experience of the Judges their use is superfluous. The same exhibitor sends a drawing for a screw regulating back pressure tube and gas tap.

NATURAL HISTORY.

JUDGES:—*Rev. W. Rogers, Chairman; Messrs. E. Bullmore, T. Webber, A. L. Fox, G. H. Fox, Howard Fox.*

The exhibition of objects in this department is not so comprehensive as on some former occasions, but some of the exhibits are of unusual merit. The Judges recommend that first silver medals be awarded to the following:—Six cases of birds and fishes, and other specimens, Mr. W. Barber, Lincoln, excellently set up. Twelve coloured drawings of birds, by Mr. J. Gatcombe, Plymouth, of very great merit. A large and beautiful collection of two volumes of sea-weeds, by Mr. Tellam, Bodmin. A collection of volcanic rocks of Cornwall, with 59 microscopical slides, by Mr. T. Clark, showing much care and skill in the preparation of the sections, accompanied by a descriptive paper.

An interesting series of bottles showing the stages of growth of the pilchard from a few weeks old to maturity, by Mr. Matthias Dunn, of Mevagissey, accompanied by microscopic slides, has a first bronze medal. A second bronze medal has been assigned to a collection of cases of fish by Mr. Bunn, Yarmouth. A small collection of botanical specimens is carefully arranged, the plants are well set up, and with a few exceptions they appear to be correctly named. A prize of £1 has been awarded to Mr. A. Fox for this. A prize of 5/- is given to Mr. Haygreen for a case of frogs, and 2/6 to E. Bridges for a case of butterflies. Mr. Perry, Penzance, sends tins of "Mount's Bay Chicks," and marinated mackerel. A meteorological summary and calendar of nature (Mr. J. G. Wells) and a new crab and lobster pot (Mr. W. S. Hearder) are not considered of sufficient excellence to warrant an award of the special premiums offered.

The following are to be noticed as kindly lent for exhibition:—A book of rough sketches of spots on the sun during the last twelve months, taken by the Rev. W. Rogers: a pair of walrus tusks, by Mr. Norris; some stones of stream tin, by Messrs. Martin, of St. Austell, who consider that three of them, found embedded in clay at the bottom of a piece of tin ground at Wheal Virgin, in the parish of Roche, are the largest in the kingdom. Mr. Howard Fox contributes a piece of pumice stone over 13 inches in diameter, picked up 600 miles from Krakatoa, four months after the great explosion. Mr. Fox also sends a 25-inch scale map of the Nare district in Meneage, with the exact positions of the so-called "conglomerates" marked thereon, from the Nare Head to Tregonwell Farm, accompanied by two cases of specimens of these rocks, and microscopic slides and notes illustrating the same. The Rev. Mr. Hole sends a box containing twelve well-filled sections of honey.

LANDER PRIZES.

JUDGES:—*Messrs. F. J. Bowles, F. E. Fox, B.A., F.R.G.S., Rev. E. R. Hole, Miss Tregelles.*

The Judges have pleasure in recommending the first prize of 25s. to an essay and three maps of North-west Canada, by R. A. Shoosmith. The essay is carefully arranged to meet the conditions proposed by the committee, and much taste is displayed in the choice of the illustrations. The other essays possess various degrees of merit, and there are several carefully-drawn maps. The Judges would recommend the young candidates not to copy so largely from books, but to render the information more in their own language, so that their essays might be worthy of higher prizes. They award prizes of 7s. 6d. each to F. Lovell and W. D. Lawry; 5s. each to J. Corder and W. J. Andrews, and also to E. J. James, whose map is very good, though the accompanying essay is defective. The maps of Lovell and Lawry are better than their essays. On the whole, the Judges consider there is enough of merit in these productions to encourage the young competitors to further effort.

SHORTHAND.

JUDGES:—*Messrs. R. N. Worth, F.G.S, and R. N. Rogers.*

The Judges of Shorthand are pleased to be able to report a satisfactory examination, though there was a falling off in the number of competitors. The test, as usual, was the taking down and transcribing extracts from a speech reported in a newspaper. One of the competitors proved capable of writing clearly and accurately over 100 words per minute, and the slowest wrote 70 fairly well, and with a little practice would speedily improve. None of the competitors have as yet, however, reached the standard which would justify the award of the full first prize. The Judges recommend the following prizes:—H. Williams, 18, Truro, £1; Mary Uran Francis, Pool, and William Opie, 20, St. Day, 15s. each; W. J. C. Gummow, Falmouth, 10s.

LACE AND ART NEEDLEWORK.

JUDGES:—*Mrs. G. C. Fox, Mrs. M. V. Bull, Mrs. Haslope.*

The Judges consider the quantity of lace very small this year, though some of the specimens sent were very perfect in design and work.

NEEDLEWORK.

JUDGES:—*Mrs. W. Rogers, Mrs. J. Stephens, Mrs. Clift, Mrs. A. Lloyd Fox, Mrs. R. M. Tweedy, Miss A. Francis, Mrs. R. Rogers.*

The Judges regret that in the department of plain needlework, (so useful in the education of all girls) the quantity sent in is much less than usual. They are glad to see that the Maria Camilla School has sent in some specimens of work, and hope it will continue to do so and improve. There are specimens of darning sent in this year worthy of a prize. The Judges recommend that the notice of prizes offered by the Society in plain needlework should be sent to the neighbouring schools as early in the year as possible.

EXHIBITION NOTES.

On Tuesday evening a lecture was delivered to a large and deeply interested audience by the Rev. W. Iago, B.A., Bodmin, ' On the alterations which have been made in the Laocoon Group and other Antique Statues." The receipts for the day were £22 18s. 6d. £18 0s. 6d. for admissions, and £4 18s. 0d. by the sale of catalogues.

On Wednesday there was as usual a full attendance. The Miners' Association of Cornwall and Devon held its Annual Meeting under the presidency of Sir John St. Aubyn, M.P., which was followed by the competitive trial of Rock Drills, at the Drill Hall. In the evening a highly interesting lecture was delivered by Mr. Marriott, assistant secretary to the Royal Meteorological Society, upon "Popular Weather Proverbs." Receipts of the day £23 17s. 0d., of which £2 10s. 0d. was for catalogues.

On Thursday the special engagements were an address in the afternoon by Mr. R. D. Roberts, M.A., explanatory of the Cambridge University Local Lectures Scheme; and in the evening a vocal and instrumental concert, ably conducted by Mr. T. J. Thuell. Receipts, £23 11s.; admissions, £22 1s.; catalogues, £1 10s.

On Friday evening the Drawing of the Prizes in the Art Union came off. Receipts, £10 4s. 6d.; catalogues, 16s.

Saturday was the closing day, and the receipts were £9 11s. 5d.; catalogues 12s. 11d.

The total takings for the week were £94 2s. 5d., including £4 for season tickets. With the exception of the preceding and the Jubilee year, this may be regarded as a good average; indeed it is fully up to the average of the preceding ten years, the Jubilee only excepted.

Exhibition Details.

CLIMAX DRILL.

R. Stephens & Son, Pool.

First Silver Medal.

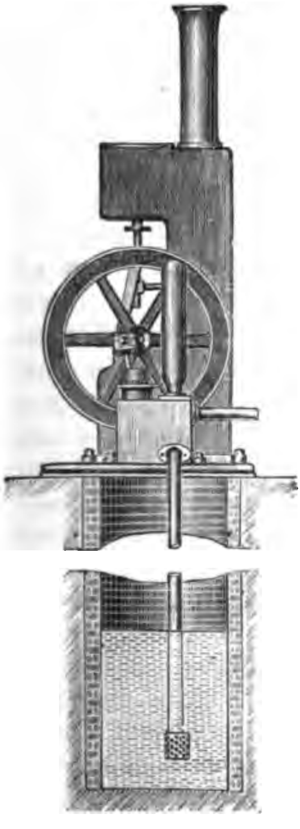
Messrs. Stephens exhibited a new patent "Climax" double air-valve Drill. The air is admitted in the usual way to one of the valve-boxes, and is conveyed through an air channel to the corresponding valve-box on the other end of the machine. These valve-boxes are fastened at given points covering the ports into the main cylinder. As the piston moves it opens smaller channels at given points leading to the end of the piston-valve. The fixing of the valve-boxes at the extreme end of the cylinder enables the makers to dispense with the ordinary ports or air-channels, and thus saves the air or steam used to fill them at each stroke. Further, the air having a less distance to travel, a greater velocity is attained. To do away with packing, the front gland of the machine is recessed and four segments fitted, making a perfect ring. These are acted upon by springs, and keep the piston-rod air-tight.

THE DOMESTIC MOTOR.

Hathorn, Davey, and Co., Leeds.

Second Silver Medal.

A want has long been felt for a simple and safe motor for small powers, requiring little attention, and not liable to get out of order. The supply of this want is the object of the Domestic Motor represented in the annexed engraving.



The motor is worked by steam at or slightly below atmospheric pressure, and, as its name indicates, is intended for use where small powers are required (say) from ½ to 2 horse power. It has a small generator in which there is not, nor can there be, any more pressure than there is in an ordinary tea kettle. It is, therefore, perfectly free from explosion; it does not require any skilled attention, nor can it be damaged by ordinary neglect. The power for working it being obtained by the condensation of steam, a small supply of water (about 1 gallon per minute per horse power) is necessary for condensation, This water can be used over and over again by the employment of a small tank. The supply of water to the engine is automatic, and as the fire can be made up to last a considerable time the engine requires the minimum of attention. The consumption of gas coke has been found by careful experiment to be 8 lbs. per horse power per hour; the cost of working it is thus exceedingly small.

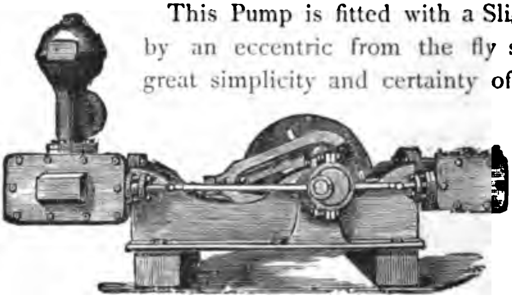
The arrangement consists of a cast-iron boiler containing a cast-iron fire-box with uptake; which is of rectangular section. The fire-box and uptake are cast in one piece, and are connected to the outer shell by cement joints caulked into the socket spaces left to receive them at top and bottom, the joint at the fire-hole being made by a ring coated with red lead and driven in. The upper part of the boiler is extended to contain the steam cylinder, which is made of gun metal and fitted with a slide valve in the ordinary way. There is no valve chest, however, the cylinder with its valve being directly surrounded by the boiler steam, while a throttle valve affords the means of stopping and starting. Of course the cylinder is by this arrangement most effectively steam jacketted. The piston is coupled by a connecting rod in the usual way to a crank-shaft, supported by bearings which are mounted on brackets cast in one with the boiler. The crank-shaft is provided with an eccentric for actuating the slide valve in the usual way, while at one end it carries a fly-wheel, and at the other a disc crank for driving the air-pump. When the engine is used for pumping purposes the pump is mounted on the bed-plate and driven from a crank-pin in the fly-wheel. The air-pump is single-acting, fitted with a plunger, not having any packing. When near the bottom of its stroke, however, it uncovers a small hole which allows water from the hot well to flow back into the plunger and over its edges, thus forming a water seal. At the high speed at which these engines are run a plunger wholly submerged would splash the water about too much, but the contrivance just described avoids this trouble, and serves the same purpose of making a water joint. The boiler is fed from a closed feed chamber which is cast on the side of the condenser above the hot well. This chamber is in free communication with the boiler by two passages—a large one leading into the steam space, and a small one leading to the boiler below the water line. The water thus stands in the feed-chamber at the same level as in the boiler. The feed-water is brought to the feed-chamber by a flexible pipe attached to a cock which has a nozzle projecting into the feed-chamber, the nozzle being fitted with a plug and float. If the water levels fall, the float, of course, falls with it, thus lowering the plug and admitting more water to the boiler until the proper level is restored. The boiler is provided with a loose cover or large valve at the top, and when starting the engine steam is got up until it blows through this valve, and expels the air from the boiler. The engine being then turned round and the condenser blown through a partial vacuum is formed, and the engine works just like an ordinary condensing engine. In practice the engine does best if the steam is kept just below blowing-off point, or practically at atmospheric pressure, as there is then no tendency for air to leak in at the stuffing-boxes of the piston-rod and valve-spindle, even if these are but slackly packed. The engine will, however, work perfectly well with several inches of vacuum in the boiler, the amount of vacuum permissible, of course, depending upon the load. In the condenser the vacuum obtained is 25 in. to 26 in., and an experiment was made to show the degree of vacuum required to overcome the friction of the engine and resistance of the air-pump, this experiment showing that with a vacuum in the condenser only 5 in. of mercury lower than the pressure in the boiler, the engine ran at its normal speed. As under ordinary working conditions the difference between the boiler and condenser pressures is about 25 in. of mercury, there is a margin of 20 in. of mercury, or (say) 10 lbs. per square inch above that required to overcome the friction of the engine available for producing motive power. This gives an efficiency of 80 per cent.

Messrs. Hathorn, Davey, & Co., find that with a good dynamo nine glow lamps can be driven per indicated horse power per hour. Numbers of these motors have been supplied for driving chaff cutters, milk and cream separators, and for pumping water for the use of country houses, farms, &c. Owing to the extreme simplicity of these engines, and the fact that there is no trouble with pressure gauges or other delicate fittings, that there is no difficult packing required, nor special lubricant of any kind, and that any unskilled labourer can work them without danger of explosion, there appears to be a very large field for them in the future. The cost of coke for working the Domestic Motor is about ¼d. per horse power per hour.

SLIDE VALVE STEAM PUMP.

ASHMORE AND WHILE, STOCKTON-ON-TEES.

Second Silver Medal.



This Pump is fitted with a Slide Valve actuated by an eccentric from the fly shaft, thus giving great simplicity and certainty of action, which is a great advantage over the ordinary system of four clacks when dealing with tar, molasses, soap, and thick fluids in various works. The ports over which the Pump Slide Valve works will pass any floating substances up to one-third the diameter of suction pipe; a valuable feature is that they can be understood by any ordinary fitter, and another point of superiority is that the ordinary Slide Valve on the steam cylinder gives an opportunity of economising the use of steam, by cutting off after each stroke has commenced, which is in itself a great advantage over those pumps which not only use steam at initial pressure for full length of stroke, but also extravagantly by exhaustion for giving motion to the valves on steam cylinder. These Pumps can be supplied without the steam cylinder, to work from any revolving shaft; and can be bolted against a wall or placed to work either vertically, horizontally, or at any angle between them.

NEW MECHANICAL MOTOR.

J. WARWICK, MANCHESTER.

Second Silver Medal.

This is a very ingenious device, in which rotating is converted into oscillating motion by means of a slotted ball.

SMALL STEAM CAPSTAN FOR YACHTS OR TRAWLERS.

W. SISSON, M.I.M.E., FALMOUTH.

Second Silver Medal.

This Capstan, manufactured by Messrs. Cox and Co., engineers, Falmouth, was designed with the particular view of securing lightness and compactness, because the first one made was required for a gentleman's yacht. He intended doing a little trawling but could afford very little space for the Capstan, and the weight also was very much restricted.

The Capstan is driven by a three-cylinder engine, of ordinary type except that it is made to reverse easily through the medium of a handwheel on the upper end of the shaft.

The cylinders, which are horizontal, 3½in. diam. and 3⅛in. stroke, are cast with the lower part of the frame, and this carries a pillar inside of which are the bearings of the crank shaft, which is of steel, and outside of which the capstan head centres; the head is driven through the medium of bevel differential gear with double pinions carried by a crosshead, the purchase being 28 to 1; and the bevel pinions and inner bevel wheels are of steel.

The capstan head is provided with hard wood staves to reduce the wear of the ropes, and the Capstan can be easily adapted to work by hand by removing the cap, slackening two set screws and inserting two, and putting on the winch handles, when the gear has a purchase of 3 to 1.

The floor space required is 25 x 23 inches, and the weight of the Capstan complete is 4 cwt. It is capable of lifting about 10 cwt., and will get in about 300 to 330 fathoms of rope per hour.

PATENT DONKEY PUMP,

HATHORN AND CO., LONDON.

Second Silver Medal.

Messrs. Hathorn and Co., exhibited their Patent Donkey Pump, for feeding boilers or draining purposes, very compact in construction, and handy and economical in use, and which has had several improvements in detail.

PATENT HYDRAULIC COLUMN.

HATHORN AND CO., LONDON.

First Bronze Medal.

The hydraulic tunnel bar of this firm has been much improved by "coning" on the column to the hydraulic instead of using a screw. This effects the most perfect and stable of joints. Coning is also introduced into their hose coupling. The award was made specially for this improvement.

Messrs. Hathorn also exhibited their "Eclipse" Drill, modified by the lengthening of the cylinder and piston, the effect of which is to give a quicker stroke and a heavier blow.

With this was associated their well known "Reliance" Compressor, improved in two particulars—the slide and the inlet valves. In the former the guide now takes all the weight of the side-rod and valve spindle—a decided and manifest gain. The change in the inlet valve is the narrowing of the seating to the 16th of an inch. These improvements were duly recognised by the Judges, who, however, expressed a wish to see a "new departure" in the way of lengthening the stroke, and the substitution of one steam cylinder of larger area for the two used.

DANGER, DISTRESS, AND RESCUE SIGNALS.

JOSEPH R. HOLMES, GLASGOW.

First Bronze Medal.

The special merit of these inventions consisted in an improved method of construction in applying the spontaneously inflammable phosphuretted hydrogen gas, and combining the same automatically with an excess of chemically prepared oxygen gas generated by the heat of the passing flame, on coming in contact with water; and the receptacle is so made as to separate or filter the refuse or decomposition of the still evolving phosphuretted hydrogen gas. The signals are self igniting on coming in contact with water.

PORTABLE HAND MACHINE

FOR FACING THE FLANGES OF STEAM PIPES & OTHER PURPOSES.

JOHN TYSON, LONDON.

First Bronze Medal.

This is a conical headed bolt, in the head of which slide thin expanding pieces for the purpose of fixing into the ends of flanged pipes or the article the machine is required to operate upon. In the shank of the bolt is a loose sleeve, a washer and a nut, so that when the nut is tightened up, the expanding pieces open out and become firmly fixed in the end of the pipe, or article, at the same time fixing the loose sleeve and preventing its revolving. Upon the sleeve is fitted a revolving arm, having a slot at right angles to the sleeve, in which slides the tool-box, and having a projection in which the handle revolves—the tool-box being free to work either way along the slot by means of the screw, upon which is fixed a bevel wheel. The handle of the machine revolves in the projection at the end of the slotted arm, and is connected to a spindle upon which is fixed two bevel wheels, either of which may be in gear with the wheel upon the screw, according to which way the tool is desired to travel along the slot.

VISIBLE DROP AUTOMATIC LUBRICATOR.

BECK & CO., LONDON.

First Bronze Medal.

The "Visible Drop," or "Sight Feed" Lubricator is, like others of its class, intended to supply oil to steam engine cylinders and valve chests, by allowing it to enter the steam pipe drop by drop and well clear of the sides of the pipe, so as to become thoroughly mixed with or impermeated in the steam, thus ensuring that all parts—such as stop valve, throttle valve, main and expansion valves and piston—shall be perfectly lubricated; the number of drops entering the steam pipe being at the same time visible by means of the glass tube through which they rise. This Lubricator differs, however, materially from others, in that all external pipes, valves, glass, &c., are entirely dispensed with, and in their stead one central tap and a shielded glass are employed, thus rendering it simpler of manipulation, less liable to injury, more compact and neater in general appearance. The oil is contained in a cylindrical vessel, within which is a tapered shell containing the tap, which can be adjusted to its various positions by means of a hand wheel; a pointer secured to the shell, and engraved directions on the hand wheel, serving as a complete guide to the various manipulations. Various ports and passages are formed within the Lubricator body and the plug, for the passage of the water acting as the driving force, and for the oil. A glass tube is centrally situated immediately over the plug, and is partly exposed by the cutting away of the metal at the two opposite sides, an outlet nozzle at the right-hand side being connected with the steam pipe, and an inlet nozzle at the left-hand side also with the steam pipe, but furnished with a condensing box or coil for the purpose of condensing the steam, and thereby supplying water for working the Lubricator. Water entering the left-hand nozzle from the condenser descends by a vertical passage at the left-hand side of the glass tube, enters the container and forces up the oil which floats on the top of it, into the vertical nozzle inside the glass tube, issuing from it drop by drop, each drop being clearly visible as it rises through the body of water contained in the glass. The oil then passes out by the right-hand nozzle into the steam pipe, and obviously at the same rate as that indicated by the number of drops passing up through the glass in a given time. The rate at which the oil is supplied can be regulated by turning a hand-wheel a little to the right or left.

ROBERTSON'S ROWLOCK.

E. Robertson, Ipswich.

First Bronze Medal.

The shaft of this Rowlock works with a ball butt in a fixed socket, in such a manner that it is always at hand when wanted, and yet is never in the way. All that is required to be done is to raise it and drop it into its socket, in which it is held by a shoulder, to ship; and to raise it and drop it inwardly when it is to be unshipped. Thus the chief advantages claimed are:—It is always to be found when and where required. It can be shipped and unshipped instantly in the darkest night, or on the roughest sea. Its simplicity renders it entirely free from complication. It has great strength of working parts.

LINCRUSTA-WALTON.

Sunbury-on-Thames.

First Bronze Medal.

This is an adaptation of Mr. F. Walton's invention of Linoleum, the leading feature of the manufacture of which is the oxidation and consequent solidification of linseed oil. Linseed, nut, and poppy oils possess the property of becoming concrete on exposure to the atmosphere. When spread in a thin layer on a surface of wood or iron, they dry or change into a thin skin. This change is produced by the absorption of oxygen, and the disengagement of carbonic acid. It is obvious that the solid oil can be obtained in large quantities, either by promoting this chemical change by some ingenious admixture of the air with a large body of oil at a time, or by exposing successive films, and then coagulating them together. The property of absorbing oxygen rapidly is inconsiderable in the crude or raw linseed oil, but is very greatly increased by boiling the oil, that is, exposing a large quantity of raw oil to a strong heat, in a cauldron, with a small percentage of metallic oxide of lead added. It is then called varnish, and has a viscid character like honey. A layer of this oil requires from six to twenty-four hours to change into a skin-like substance, according as the state of the atmosphere is more or less favourable.

This, in brief, is a description of the process which led to the invention of Linoleum, and, also, ultimately to the invention of Lincrusta-Walton. It is, in fact, the connecting link. For many years the attention of inventors had been directed to the production of a material *in relief*, for mural decoration ; but the difficulties in the way were not slight, nor to be easily overcome ; indeed, at one time they appeared to be insurmountable,because of the many conditions which seemed inseparable from any invention that was to command success. The desideratum was a material capable of receiving and retaining impressions from a matrix, a material which should be plastic when required to mould it, and rigid after it was once formed, and which should be of flexibility sufficient to admit of its being fixed on to some ground work, such as canvas, and made up in continuous length. Added to these it was required that the new relief wall decoration should be of a permanent nature, not easily damaged, and superior to the effects of the atmosphere. Such were the terms on which, alone, any inventor could hope to succeed, and in Lincrusta-Walton the inventor has boldly faced all the difficulties, and successfully overcome them.

Lincrusta-Walton, therefore, is a mixture of linseed oil and fibre, rolled on to a fabric, and subjected to the pressure of machinery, which stamps out the various designs in a greater or less relief as may be desired. Before passing away from this part of the subject, a word or two as to the name given to it will be of interest.

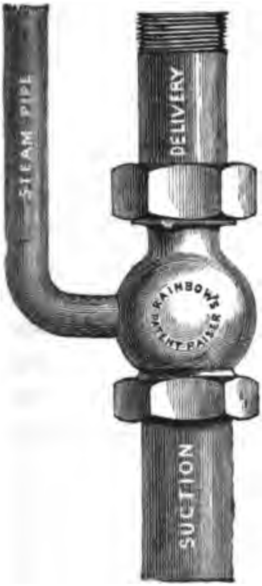
It was first submitted to the public under the name of "Linoleum Muralis," with a sub-title of "The Sunbury Wall Decoration." The first name was given it from its being made of Linoleum, and being devoted to mural decoration; the secondary title from the name of the place where it is manufactured, Sunbury-on-Thames. The material still retains this latter title as a subsidiary name, but the first name of Linoleum Muralis has been dropped, and the present title "Lincrusta-Walton" retained in its stead; the derivation of the name being from "Linum"—flax, as the chief ingredient of Lincrusta is solidified linseed oil, and "Crusta"—relief; the inventor's name being added to prevent other firms using the word Lincrusta after the first patent shall have expired.

When hung upon walls, &c., the material may be left in its natural colour or painted. The broken and modelled surface of the material admits of its being finished in perfectly flat colours, and being washed and scrubbed with impunity, and without any deterioration from a decorative point of view. Lincrusta is a non-conductor, and is thus admirably adapted to give a warmth to rooms, which, from their situation, or from their being only used occasionally, would otherwise be damp and chilly. Not only can it be washed and scrubbed in the ordinary way, but weak dilutions of acid can be employed in its cleansing, and in rooms which are used for public purposes, and where the walls receive and retain the exhalations of many breaths, the importance of this quality of cleansing can hardly be over valued. These remarks are equally applicable to Lincrusta in its raw manufactured state, and when destitute of any painting or decoration as well as when so treated.

RAINBOW PATENT STEAM WATER AND LIQUOR RAISER.

C. H. Rosher, London.

First Bronze Medal.



This is an apparatus for raising and forcing water and other liquids by the action of a jet of steam or air injected through a nozzle and receiving cone fitted within a bulb or vessel, the apparatus being applicable for raising water from a well, river, pond, or other source, tank, vat, or other container, ship's bilge, or other place to any desired distance, or, with slight modification, as an injector for forcing water into a steam boiler against the pressure of steam therein.

A suction pipe, communicating with the well or other place from which the water is to be raised, has a hollow bulb screwed upon it at a point not exceeding 25 feet above the level of the water to be raised, although it may be situated at any point below such level. This bulb is traversed by a tubular chamber, preferably cast in one with the bulb, leaving a free passage around the chamber from the suction pipe to the delivery pipe. This chamber is closed at one end by a screw plug, removable for blowing out any obstruction which may lodge in the bulb or pipe, and its other end is in communication with a pipe connected to the steam boiler or compressed air chamber, as steam or air is used. The delivery pipe is connected to the bulb by a screw coupling. The point of discharge may be at any height, according to the pressure of steam or air available. A nozzle communicates with the chamber, and a receiving cone is fitted within the orifice of the delivery pipe, the nozzle and cone being in the same axial line. For the purpose of raising water the receiving cone has its smaller orifice towards the nozzle, and its larger orifice towards the delivery pipe. The lower orifice of the cone is flared, or trumpet mouthed, and it is upon this form that the desired suction mainly depends.

In operation the jet of steam or air issuing from the nozzle and directed towards the opposite flared orifice of the cone causes a suction in the pipe and bulb, thereby forming a partial vacuum therein. This is immediately filled by the liquid rising in the suction pipe and bulb, which liquid is carried along with the jet through the cone, and forced by the pressure of the steam or air through the delivery pipe to the height or distance required. In the apparatus as modified for use as an injector for feeding steam boilers, the nozzle is longer and projects partly through the cone, which is reversed in position, its larger orifice being towards the nozzle. The apparatus may also be used for exhausting gases, foul air from mines, and similar purposes.

PATENT MACRAME LACE LOOM.

Anyon's Macrame Lace Loom Company.

Second Bronze Medal.

A neat and handy device in substitution for the cushion or pillow with its skewers and pins. This is effected by an arrangement of strings and rollers, which allows the work to be one much more readily, and with an absolute uniformity of ure, only attained in the old method after very long practice. Loom is convenient and portable, and stands upon the table.

IMPROVED WATER CHURN.

MR. G. THOMAS, TRURO.

Second Bronze Medal.

This is a churn worked by water power. Float-boards are put on the outside of the box, which thus becomes a hollow axle.

DEVONSHIRE FAIENCE AND ALLER VALE TERRA COTTA.

ALLER POTTERY COMPANY, NEWTON ABBOT.

A series of medals and other awards were given to the actual artists represented in the fine collection of ceramics sent by this Company, which included:—FAIENCE.— Vases, ewers, &c., in bright glazes, with seaweed and shell, flower, and sgraffito decoration; also in "amber" and "huacco marble" ware; jardinieres and coupes, with pierced and incised decoration, and fitted with loose flower pots; buff and red ware fern pots and stands, with incised or sgraffito decoration. TERRA COTTA.— Thrown and turned plaques, vases, pilgrim bottles, &c., in red (new bright and warm colour) and buff; also in black lacquer, and shaded coloured background. DOMESTIC ART POTTERY.— Normandy pitchers "a l'eau chaude"; Tyrolese pitchers; Aller stoneware jugs (coloured topping); toby shaped jugs; (figured and sgraffito decoration;) Egyptian flagons, goblets and trays; water bottles (Terra Cotta) plain and sgraffito; egg stands and cups; peppers, salts, and mustard pots; flower and menu holders for dinner table; dolphin, and beaded candlesticks; teapots in terra cotta, and also glazed. The Company themselves did not exhibit in competition.

PATENT WELDING CLOTHS FOR IRON OR STEEL.

SABATIER & CO., LONDON.

Highly Commended.

In these soldering plates or welding cloths the soldering composition is kept together by a network of wire. The sections to be joined are moderately heated "blood colour," and the piece of cloth, cut to the proper shape, introduced between the fractures. The pieces being closed together, are put back into the fire till they attain a dull white heat, when the entire piece is hammered into shape. In the case of iron with cast steel, the iron is to be heated "doughy," while the steel is to be "clear red." The soldering being regular and homogeneous, is found to be perfect, as not only is it impossible to produce a fracture at the point of juncture, but the operation effects no change in the quality of the metal, and is carried out at a saving of 30 per cent. both as regards time and fuel.

STANDARD WIRE GAUGE.

SABATIER & CO., LONDON.

Messrs. Sabatier & Co. also exhibited, in addition to a circular gauge of the usual shape, a combined folding measure and gauge, 6 inches long when opened, divided on one edge into inches, quarters, and eighths, and on the other indented with the new gauge numbers from 1 to 26. This article, which has been registered and approved by the Standard Department, also answers admirably as a workman's square, a mark upon the surface clearly showing the point to which it should be opened to indicate the angle of 90°.

OMBRELLUNA, OR PATENT UMBRELLA HOLDER FOR CARRIAGES.

C. BUTLIN, CAMBORNE.

Commended.

The umbrella in this device is attached to an arch that can be fixed instantaneously, and retained in any position. The umbrella will shift laterally, and make a semi-rotation of the arch. It can also be elevated or depressed, so as to suit persons of different heights.

DISINFECTING APPARATUS.

LONDON PATENT AUTOMATIC DISINFECTING COMPANY.

Recommended for Trial.

This is a neat little arrangement which can be applied to any closet or urinal, and which secures the certain application of an adequate quantity of disinfecting and deodorising fluid every time of use. It is charged with sufficient material for 10,000 gallons of water, and any disinfectant may be used.

IMPROVED VENTILATING FAN.

CAPT. W. TEAGUE, JUN., CARN BREA.

Captain Teague, jun., who has paid great attention to the subject of mine ventilation, arranged and exhibited a very compact hand exhaust ventilating fan. He claims for this machine a combination of the utmost simplicity and complete effectiveness. It stands on its own plate, and has neither pulleys nor belts. Its use in many places enables the men employed to do a much larger amount of work than they would be capable of doing without it.

THOMPSON PATENT PULVERISER.

GLOBE MILL COMPANY, LONDON.

A model illustrating a portion of this apparatus was exhibited, and described at length in a paper read by Mr. Rickard before the Miners' Association. Mr. Rickard said that like all other machines of the pulverising kind, it required the orestuff to have first undergone crushing—the pieces were to be the size of walnuts. The feed was by a hopper with jigging action ; and the pulverising was effected by a ball, operated by discs. The ball was kept by the motion of discs in a continual state of revolution, but was entirely free in its movements, and, therefore, revolved on an ever-changing axis. This was the distinctive feature of the Globe Mill, and that which made it, though so simple as a mechanical idea, in advance of any pulveriser as yet invented. The ball had a double motion—one of rotation, another of translation ; and it combined the pounding action of the stamps and the grinding action of the crusher. Owing to this, the outlines of the discs were always found to be definite and regular. This disc seized the ball whenever the motion flagged, giving it fresh impetus. It always wore perfectly spherical. When once started, the ball, carried by centrifugal force, tended to fly away from the centre of revolution, and pressed against the steel shoe ring, grinding the material as it flew around. If a stamp head weighed 500 lbs., and the fall was 1 ft., the crushing force exerted at one stroke was 500 ft. pounds. That of a ball 180 lbs. weight, diameter 8 ins., revolving 300 times per minute round a 30 in. mill, would be 5508 ft. pounds, or in the ratio of 10 to 1. At each revolution the pulverised material was washed against the screen fitted at each side of the mill — that in a sufficiently fine state of division passing through to be carried into troughs for any further treatment thought necessary. The action of the screens or grating materially differed from that of the Cornish stamps. The relation of the grate to the mortar was uniformly maintained; and there was a quick and regular, though intermittent, delivery of crushed material through the grate. Another great advantage was economy of power. The work done was constant, and the quantity of water used was only half that of the stamps. Another advantage was that the Pulveriser was self-contained and easily fitted. A 30 in. mill, running at 300 revolutions, with an indicated horse-power of 6⅔, pulverised lately at Greenwich 20 tons of the hardest Indian gold quartz per day of 24 hours.

CLARK'S PATENT IMPROVED TRANSIT INSTRUMENT.

A. J. Frost, London.

This transit instrument is designed for the purpose of obtaining accurate time in all parts of the world. Its employment is of the simplest character, and does not require any knowledge of astronomy or the stars, or calculations of any kind. In ordinary hands it will easily give time true to the second.

In the larger form the telescope is 18 inches in length, and the object-glass 1¾ inch aperture. The striding level is 9 inches long, and the axis of the transit instrument is 9 inches between bearings. The illumination is of the usual axial character, with a candle lamp and small reflector in the interior of the telescope. The interior adjustments for collimator and focal distance are quite novel. The instrument is also provided with a diaphragm of contracted aperture, so that a meridian mark can be sharply focussed at a distance of 30 yards or even less, which is often an important advantage. It is secured down to the base by an excellent spring arrangement, which allows of perfect adjustment of level while affording perfect security against all other movements. It may be levelled by either three screws or four, but the use of four screws is recommended on account of the greatly increased steadiness.

The especial convenience of the instrument consists, however, in the means by which the altitude circle is set and adjusted, and the telescope held steadily in position while the observation is being taken. This is effected by a tail-piece attached to the vernier circle by a clamping screw, which rests against a stop on the uprights or the base plate, with a fine adjusting screw. By this means the star is brought perfectly on to the horizontal wire, and the telescope held firmly in position. The use of the small level is thus dispensed with, and the adjustments are all made indoors, none being required in the open air.

One form is specially designed for fixing on a window-sill, but is at the same time equally adapted for use on a wall or pillar. Its focal length and optical power are the same as those of the ordinary instrument, and the object-glass has the same aperture. For practical use it may be considered identical with the ordinary 13-inch transit. It is, however, totally different in appearance, owing to the fact that the diagonal eye-piece is dispensed with, and the prism is increased in size and placed in the axis, which is at this point enlarged, the telescope being bent at right angles. Its collimation is not so easily affected as that of the ordinary form, and can only be tested by a suitable collimator, or by the Pole Star; but the collimation is carefully adjusted and tested before being sent out.

TUCKER'S IMPROVED WEATHER-TIGHT SASHES AND FRAMES.

J. D. Tucker, Bromley, Kent.

In these windows india-rubber cushions are fixed in the top, bottom and meeting rails of sashes, which fit into hollows, sunk in the window head and sills; the meeting rails are made to fit likewise. The runners or parting beads are screwed to the pulley stiles, and so constructed as to fit into the sashes, making the window practically air tight.

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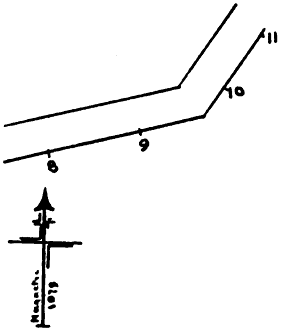
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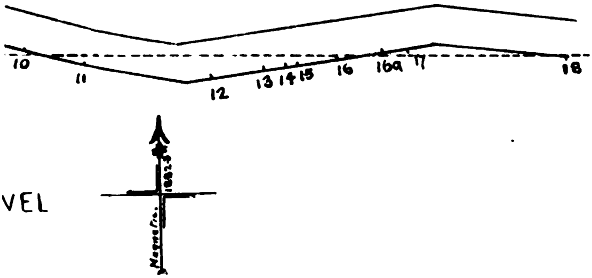
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A DESCRIPTION OF THE
FLORIDA MAIN-LODE, CARDIGANSHIRE,

Preceded by a General Account of the Mining District.

BY EDWARD HALSE,

ASSOCIATE OF THE ROYAL SCHOOL OF MINES.

I.—General Geological and Lithological Structure of the District.

The strata form part of the Lower Llandovery and Bala rocks of the Geological Survey, and are divided by Mr. Walter Keeping, F.G.S.,[1] into three groups:—

C. The Plynlimmon grits; B. the metalliferous slate group, forming a broad band of contorted country on each side of C.; and A. the Aberystwith grits (the Aberystwith group of Prof. Sedgwick).

B. is "especially thrown into frequent and violent twisting with, in many places, actual reversion;" and, again, "the original natural order of these rocks has been destroyed......... by a series of inversion folds."[2] The whole thickness is estimated to be not less than 2000 feet. The axes of elevation are directed N.S.,[3] and the lodes E.W., but in reality the lodes cut the beds and the main joints[4] at an oblique angle.

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[1] "The Geology of Central Wales," *Quart. Jour. Geol. Soc.*, Vol. 37, 1881, p. 141—170.

[2] See figures 1 to 6 in his paper. For some minor contortions see a paper by myself in *Science Gossip*, 1883, p. 200, fig. 120 to 123.

Lithologically the "country" is shale, clay-slate, slate, grit, or conglomerate, but towards the mining centres grits[5] gradually disappear, "shales become more and more indurated and cleaved," until, in the centre of the district "beds of hard, pale indurated slate-rock with bed-bandings occur, and in the immediate neighbourhood of the mineral veins such induration is nearly always well-marked." Only here and there is there a bed of grit, or rather does "clay-slate appear to merge into grit-stones."[6]

The normal "country" is a much metamorphosed clay-slate of a "pale blue gray" colour.

II.—The General Characteristics of the Lodes.

These were given long ago by Prof. Smyth, F.R.S., in a well-known memoir.[7]

1.—Mineral Zones.—These correspond to the strike of the Llandeilo strata as the latter come in anticlinal curves to the surface, and are roughly parallel to one another. The barren belts of ground between are for the most part synclinals filled with Bala, Llandovery, & Wenlock strata.—*(D. C. Davies, F.G.S.)*

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[3] Prof. Smyth gives N. 10° E.—N. 22° E. (true) as the strike of the beds. From Aberystwith to Logylas N.E. (mag. 1866,) or the Longmynd system, (Moissenet.) My own observations gave N. 35° E., with an average dip of 66° E. 35° S., to N. 55° E., with an average dip of 63° E. 55° S., or N. 35° W. (All magnetic, 1882.)

[4] The main joints run N. 55° W., and dip 87.5° N. 35° E., and 52° S. 35° W., and also N. 35° W., with an average dip of 42¼° S. 55° W. (Magnetic, 1882.) Other joints strike E.W. to E. 15° S., about the same direction as the lodes.

[5] See the yellow dots on quarter-sheets 57 N.E., and 57 S.E., marked b^4 or Lower Llandovery rocks—"Sandstones and Slates."

[6] *Science Gossip*, 1883, p. 34.

[7] "On the mining district of Cardiganshire and Montgomeryshire," *Mem. Geol. Surv.*, II., 1848.

2.—Strike.—The lodes are markedly parallel, from a few degrees north of east to a few degrees south of east (magnetic.)[8] A glance at the one-inch Geological Survey Map, quarter-sheet 59 S.E. and 57 N.E. shews this—the most important exception being the Comet Lode of Cwm Ystwith.[9] The lodes of quarter-sheet 57 S.E. are also of exceptional bearing,[10] but mining in this part of the district is at present abandoned.

The lodes as laid down on the one-inch map are seen to consist of long serpentine curves; as plotted on an ordinary mine-plan, each large curve is shewn to consist of a number of smaller bends, giving the lode a characteristic zig-zag appearance. But such appearance, more especially in the wider lodes, is often simply the result of exploitation, the level following the change in the relative position of the leader or leaders.

Moissenet gives as the 'useful direction' of the Lisburne mines E. 40½° N. (true), but this will not apply to every mine in the district.

3.—Dip.—The dip is high, from 70° to 80° S. (prevailing) or N.; exceptions—the Comet Lode, 30° and 40°, Esgair-y-Mewyn, 60°.

4.—Thickness.—The lodes as a rule are apt to run large—3 to 4 feet on an average, 6 to 8 feet not infrequent, and exceptionally 30 feet (*e.g.* Esgair-y-Mewyn, Frongoch.)

5.—Structure.—It is mostly brecciated—angular fragments of "country" cemented by quartz, or by ores; or, more rarely, calcite cementing angular fragments of galena and blende. *(Smyth.)* The lodes are seldom banded, and, when so, calcite often takes the inner side of quartz, and galena the inner side of blende *(Smyth)*; but the bands as a rule do not keep the same relative position for a long distance, either vertically or horizontally.

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[8] The average of 11 lodes was E. 26¼° N. (true.) MOISSENET, *Annales des Mines*, t. 9, 1866, p. 6. He refers the filling to the system of Ballons, or posterior to the deposition of the Carboniferous Limestone.

[9] See plate 11 of Prof. Smyth's Memoir.

[10] Rhysgog main-lode N 31° 5′ W.—Esgairgadfach, N. 34° E., (Mag. 1880.)

The lodes are sometimes, as will be seen hereafter, of what may be termed an *independent-vein-structure, i.e.* consisting of veins not laid as in ordinary banded structure one upon another, but separated by portions of whole and apparently undisturbed "country."

6.—Contents.—They are mostly "country," either whole or brecciated, with quartz, blende, and galena. In portions of the district where arenaceous beds abound, copper pyrites is a common constituent. *(Smyth.)*

Metallic Minerals.—Galena[11] in crystals or massive, forming 6% of the lodes of Frongoch, and 22% of those of Level Fawr, with from 2 to 75 ounces of silver per ton of dressed ore; cerussite and pyromorphite (the former is associated with calcite) uncommon; blende in tetrahedral crystals or massive-radiated; calamine (silicate) rare; copper-pyrites, near the surface, or the prevailing ore; malachite, black oxide of copper (in "gossan,") and blue carbonate of copper (on malachite from a surface-heap); iron-pyrites (ordinary and prismatic,) in scattered crystals as a rule; carbonate of iron and psilomelane rare. *(Smyth.)*

Gangues.—Quartz is the most common, in the condition of "sugar spar" where the ores are most abundant, but also in hard transparent crystalline masses and veins; calcite is abundant in some mines, and then often associated with copper pyrites; baryta, rarer; and witherite still more rare. *(Smyth.)*

7.—Gossan.—Scarce, and appearing to be limited to lodes of a certain character.

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[11] Prof. Smyth says galena is the most abundant metallic mineral of the district, but blende appears rather to be so. The earlier mineral statistics are misleading on this point, for formerly blende was little worked, but now all blende is carefully preserved and dressed.

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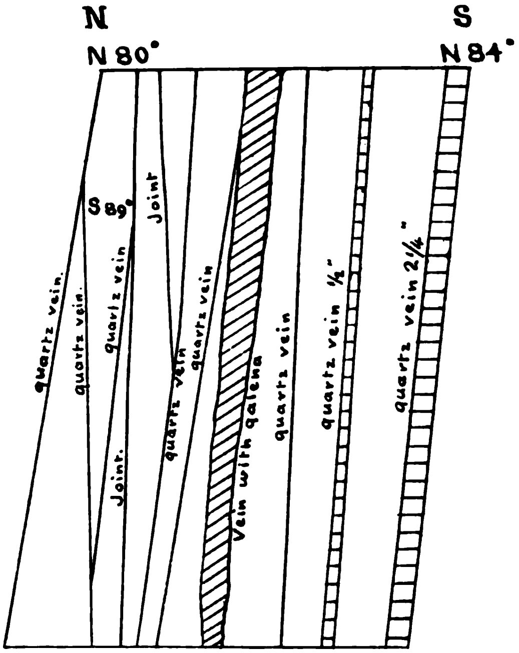

DIAGRAM I.

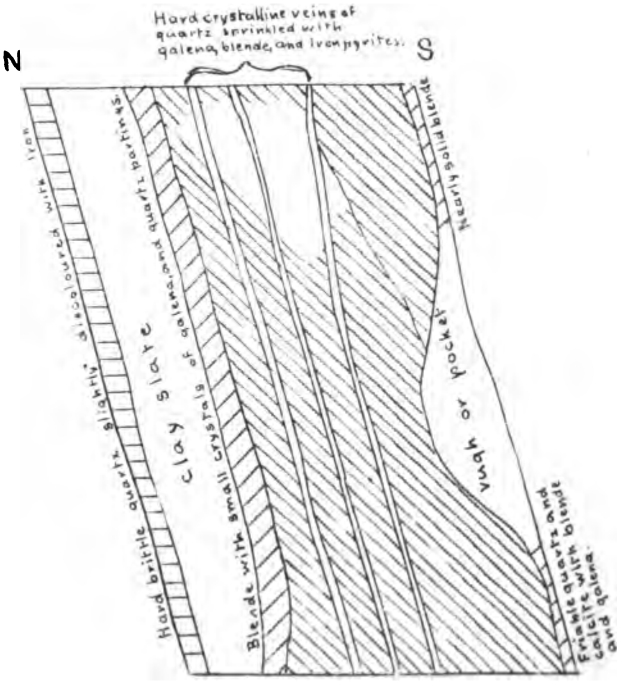
N
S
Hard crystalline veins of quartz sprinkled with galena, blende, and iron pyrites.
Hard brittle quartz slightly discoloured with iron
clay slate
Blende with small crystals of galena, and quartz partings.
vugh or pocket
Nearly solid blende
Friable quartz and calcite with blende and galena.

DIAGRAM II

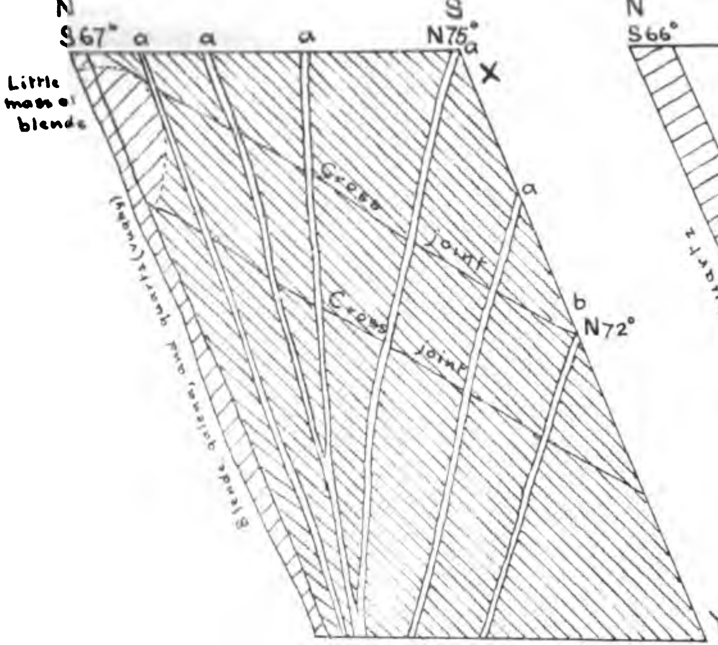

DIAGRAM III

a a Chiefly quartz, here and there a little galena and blende

b. Thin layer of cerusite, quartz and galena.

▨ Lines of cleavage

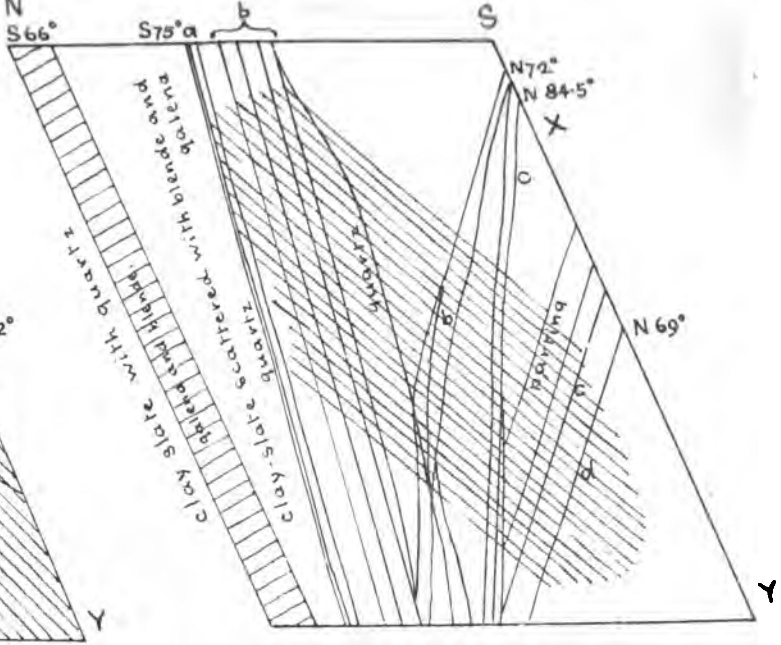

DIAGRAM IV

a blende (3/8").

b quartz with some blende and galena.

c quartz, cerusite, and galena.

d joint with layers of the same minerals

▨ Lines of cleavage.

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8.—Shoots or Courses of Ore.—They are of small horizontal extent, and appear to follow the dip (W.) of the cleavage, rather than that of the beds. *(Smyth.)*

This remark refers to the dip of the cleavage in the thick and hard beds, for I have observed that the dip of the cleavage in the thinner and softer beds is to the east [12]

9.—Cross-courses and Slides.—The former are almost, if not entirely unrepresented. A few partings and thin clay slides give rise here and there to throws, of from a few inches to one or two feet, measured horizontally.

The hardness of the lode and country is a characteristic of the district, but, from the author's experience, it constantly varies, and appears to be greatest when the lode is formed of a series of quartz veins running through the solid country; and then the lode is poorest.[13]

III.—DESCRIPTION OF THE MINE.

The Florida Mine is situated about midway between the Esgair-y-Mewyn and Caron Mines.[14] To the north the westerly extension of the Esgair-y-Mewyn main-lode has the following characteristics:—Country comparatively soft, lode soft, in places workable with a pick, and then practically barren of ore; lead-ore apt to occur in a body, especially near the surface, as massive non-argentiferous galena with cerussite; prevailing gangue calcite; gossan at the surface, and to some depth below, showing black oxide of copper; strike, a few degrees north of east

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[12] See *Science Gossip*, 1883, p. 33, fig. 30, the hard beds, 1, 2, dip 68° W., the soft beds, *a b* dip 81° E.

[13] "La roche encaissante de dureté moyenne est á Logylas, comme presque partout, favorable á la richesse du gîte." MOISSENET, *op. cit.*

[14] The exact situation of the mine is 1 mile east of the village of Pontrhydfendigaid, and close to the Strata Florida Abbey.

(magnetic); dip, N. 60°, regular; thickness, variable, in places 3 to 4 feet, with well-defined walls coated with flucan, and exhibiting regular slickensides; in this lode there is a general predominance of massive lead-ore above, and crystallised blende below.

The chief points of interest in the Florida main-lode form a marked contrast to the above:—Country, very hard; lode, usually hard, often brecciated, scattered with lead-ore (crystallised, seldom massive) and blende (massive, crystals rare) mixed or separate; gangue, quartz; gossan rare; strike a few degrees south of east (magnetic), but irregular; dip S. 75° to 80°, also irregular; thickness 4 to 8 feet or more; walls indefinite, or hanging-wall definite, and foot-wall obscure; slickensides irregular; blende prevailing above, galena with blende below, but both occurring in shoots inclining west.

About 1½ miles south is a parallel lode (the Caron Mine) which was vigorously worked for a short time; but which is now lying idle. The "country" in the latter is decidedly lighter and less hard than that of Florida, and, as a matter of fact, the lead-ore was found to diminish rather than increase in depth, which of course led to its speedy abandonment.

No east and west lode has been worked further south than the Caron, hence probably the Florida lode is near the confines of the mineral belt of Cardiganshire.

As the mine is as yet a very shallow one, there is nothing of special interest in its plan and section. The present workings are 50 fathoms from the surface, or 30 fathoms below adit. The courses of ore appear to dip west somewhat rapidly.

Adit-level.—To the west of the engine-shaft a great deal of massive blende has been worked away—here driving by hand-labour was £2 to £4 10s., and stoping 25/- to 47/6 per running fathom, consequently the ground was easy to work. Near the shaft to the east was found a branch-vein of solid galena with a little cerussite, 3 to 5 inches thick, striking 15° N. of E. (magnetic, 1878,) and dipping 69.5° S., but it soon died away in the country. At the east end of the adit the lode consists of more or less solid blende of radiated structure with quartz, in a hard lode and country—the cost of driving was £5 15s. to £7, and stoping 45/- to 50/- per running fathom.

The stopes between the adit and the 20-fathom level are old, but they appear to have been worked in lead and blende. Westward the lode becomes soft and unmetalliferous; eastward it is harder, and in the 18-fathom level it is in payable quantities, and consists of crystallised galena scattered through a hard matrix of quartz and country for a width of 8 feet or more—cost of driving £6 to £7 per running fathom. On the whole the lode is very similar to that in the level below, although the ore is less scattered, and there is less of it.

30-fathom level.—When a cross-cut from the engine shaft cut the lode at this depth it was mostly blende, and moderately hard and wet, but further east lead-ore came in in patches, and at the winze, where a branch falls into the lode, a wide deposit of galena was found for a length of one or two fathoms.

Westward a vein of galena was followed in the usual hard ground for a few fathoms, but at 5 fathoms from the east wall of the cross-cut the "country" became soft, shaly, and of a light colour; the lode consisted only of an inch of galena on the north wall, striking a few degrees N. of E., and dipping S. 66°; and, further on, the lode split into two, blende being on the north, and galena mostly on the south side. As a few feet in advance of this nothing but a vein of "crumbly spar and calcite" was to be seen, the lode was abandoned in this direction.

Figure 1 shews the level east of the cross-cut as far as the winze, and Table I. is a description of the lode between these points somewhat in detail.

Between 2 and 3 a branch from the west falls into the lode. When cut by the cross-cut, a fathom or so north of the lode, this branch consisted of fine crystals of galena scattered through a hard matrix. It was explored to the east, and it developed into a string of galena from 1 to 1¼ inches thick, striking 15° S. of E., and dipping 49° S.; when near the main lode it consisted of galena, white quartz, and a little copper-pyrites.

The gradual improvement of the main lode when the strike was N. 14° E., is very noticeable. The "country" from 1 to 11 is only moderately hard, and does not vary much in degree. Although the bearing from 3 to 11 is a good one,[16] yet it will be seen that the lode was not uniformly metalliferous throughout this distance.

At the junction, or just beyond 11, the lode was 14 feet wide with lead-ore mostly on the north wall, and blende on the south In the latter direction the ore showed a concentric structure—clay slate forming the centre, then quartz, galena, quartz, blende, &c The dip on the north side was N. 81—82°. For 10 feet from this side the lode was very metalliferous, and crystals of galena and blende were scattered from this point to four feet further south.

Figure 2 shows the main lode from the junction for the next 32 fathoms to the east, and Table II. describes the lode for this distance.

The character of the lode varies in a remarkable manner, and there is a decided connection between the filling and the bearing. For the first two or three fathoms the lode runs 2 or 3° S. of E., the lode here is comparatively soft (or brittle,) and poor, but just beyond 3, or where the strike is E. 6° N., it is noted that "the leader on the north wall is richer," the ground, too, becomes

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[16] The bend between 9 and 10 does not represent the real bearing of the lode at this point. The level was turned north to meet the winze which was sunk on the northern portion of the lode.

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,,	6					large vugh in the bottom.			
,,	12					Less galena—some galena and blende in the bottom.			We are out of the vugh.
,,	15					Good galena with some blende.		10	Ground much easier.
,,	26	E 14° N			14 ft.	....		11	We have struck into the winze.

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* The metalliferous portion only.

harder. Diagram 1 represents the lode just before it changed for the better. The metalliferous portion is only a central leader of quartz with galena from 2 to 4 inches thick, the rest of the lode consists of a number of quartz veins, more or less parallel, and dipping variously, intersecting hard clay-slate. The ground here is very hard (£8 per running fathom,) but it becomes easier after the quartz veins have given out, and improves in richness at the same time, the ore being more concentrated.

At 6, or where the lode turns south again, blende predominates; at 8 the southern half is almost all blende, while the northern half is capelly, and full of veins of quartz—a sure sign of poverty in this mine.

From 8 to 9 the lode runs only 2° S. of E.—an improvement is immediately seen, galena comes in in small veins and patches, and in some places is more abundant than blende; and associated with it is tender quartz, and traces of pyromorphite, which here often accompany good ore.

From 9 to 12 the lode runs several degrees south of east; the ground here is soft, brittle, or slaty, which sufficiently accounts for the great deviation in the strike, and also for the poverty of the contents.

At 10—Diagram 2—the metalliferous portion consists of but two bands of blende with traces of galena. Running parallel with, and dipping in the same direction as these in the centre of the lode, are several quartz veins. Here, too, cleavage is visible. The rock at this particular point is hard but brittle. At 11 it is softer; at 12 the lode courses E. 7½° N., and "more lead is visible." The "vugh" was mostly filled with cerussite, and little cavities were lined with it. Just beyond this point the ground was temporarily very hard, and contained "very little ore." (See Diagram 3.) There is shewn but one leader of blende, galena, and quartz on the north wall. The quartz veins dip variously, and cleavage is visible throughout. The line X Y (and this remark applies also to Diagrams 4 and 5) did not exist in the lode, in reality the joints drawn up to it extended to the roof, and, of course, beyond, giving the lode a curious wedge-shaped appearance. This almost extreme poverty was followed the next day by the appearance of a most promising leader.

At 3—Diagram 4—the ground is of the normal hardness (£6 per running fathom) for lead; cleavage is visible only in the middle of the lode, and the quartz veins have a tendency to be mixed with ore, and to lose their hard crystalline character. A little further on—14, Diagram 5—the leader is considerably wider—the ore is concentrated in this one single vein; instead of quartz veins there are mere joints of division, and no trace of cleavage is to be seen. The vugh was composed of what appeared to be (*a*) fragments of an old vein, (*b*) fragments of country, and (*c*) more recent minerals. *A* were somewhat rounded masses of extremely hard clay-slate, sprinkled here and there with galena and blende; *b* were small, easily separable, and apparently cemented by cerussite; *c* consisted of stringy blende, with galena, cerussite, and iron-pyrites. The latter may not have been deposited *in situ*, for one specimen examined had curved crystals of ⅛ to ⅜ inch side on galena and blende, and were coated with a little pyromorphite and cerussite.

The carbonate of lead was clearly one of the last minerals formed, and was gradually replacing the iron-pyrites. Filling the smaller cavities were beautiful crystals of cerussite, from transparent to various shades of brown, pink, and red.[16]

At 15—Diagram 6—the vugh has disappeared, but the lode is very similar. The only point to be noted is the increase in the dip and thickness of the leader. In both places the ore has a tendency to be concentrated on the foot wall of the metalliferous

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[16] Specimens of this mineral, and of the iron-pyrites, were deposited in the Museum of the University College of Wales, Aberystwith.

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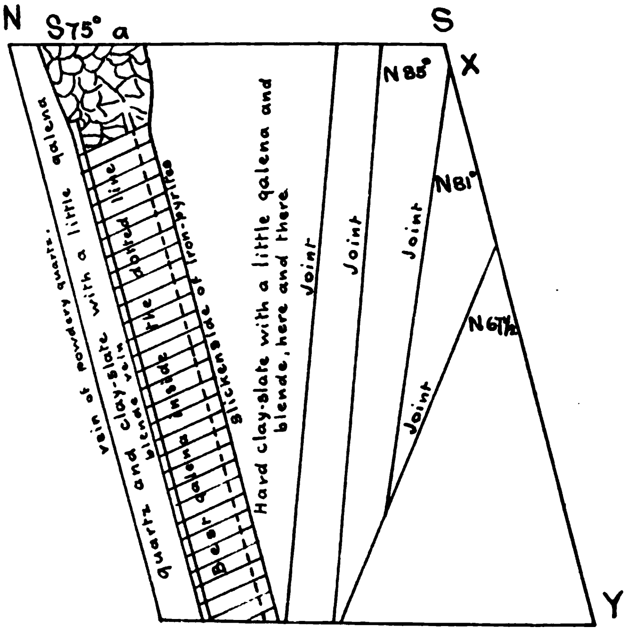
N
S75°
a
S
X
N85°
N81°
N67½
Y
vein of powdery quartz.
quartz and clay-slate with a little galena
blende vein
best galena inside the dotted line
slickenside of iron-pyrites
Hard clay-slate with a little galena and blende, here and there
Joint
Joint
Joint
Joint

DIAGRAM V

a Vugh in leader (7–8 inches thick) of galena & blende

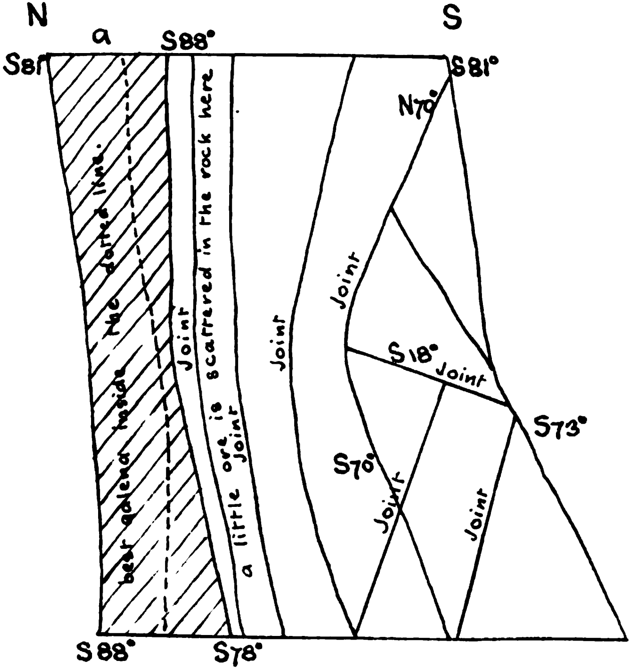
N
a
S88°
S
S81
S81°
N70°
best galena inside the dotted line.
Joint
a little ore is scattered in the rock here
Joint
Joint
Joint
S18° Joint
S73°
S70°
Joint
Joint
S88°
S78°

DIAGRAM VI

a Leader of galena and blende, mostly former.

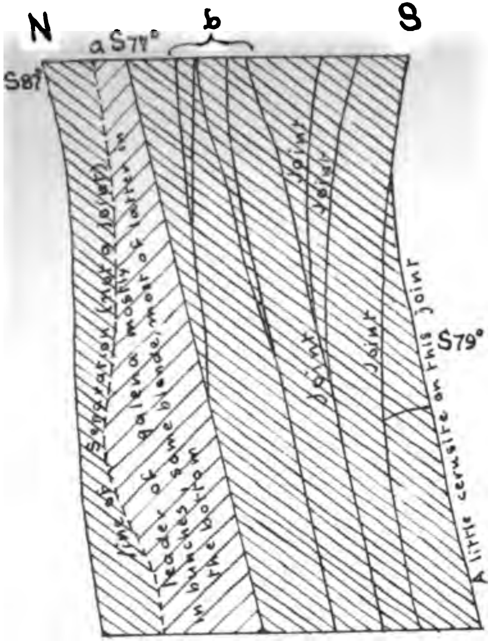
N
S
b
a S77°
S87°
S79°
line of separation (not a joint)
leader of galena mostly in bunches; some blende, most of latter in the bottom
Joint
Joint
Joint
Joint
A little cerusite on this joint

DIAGRAM VII

a. Leader, on the top mostly blende with a little galena and iron-pyrites.

b Quartz veins, with blende & a few crystals of galena.

▨ Lines of cleavage

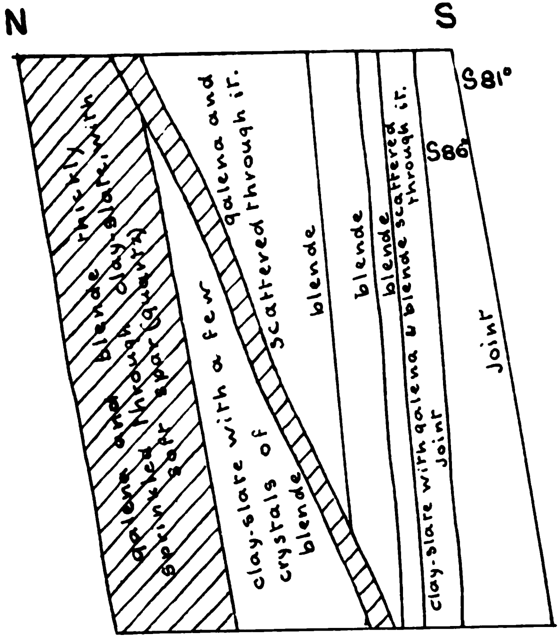
N
S
S81°
S86°
galena and blende thickly sprinkled through clay-slate, with soft spar (quartz)
clay-slate with a few crystals of blende
galena and scattered through it.
blende
blende
blende
clay-slate with galena & blende scattered through it.
Joint
Joint

DIAGRAM VIII

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vein. The leader is nowhere solid galena throughout, although here and there are solid bunches or strings. It is generally mixed with quartz and blende, and is still oftener scattered through clay-slate. This perhaps is well seen in Diagrams 7 and 8. In the former, at 16, the ore is shown concentrated on the hanging-wall of the vein. The vein has no joint on the north, although there is a distinct line of separation between it and the clay-slate. Cleavage once more temporarily puts in an appearance.

In Diagram 8—about 16*a*—the vein consists of galena and blende thickly sprinkled through clay-slate, and tender quartz. A "dropper" of blende falls off from the hanging wall, and several minute blende veins run parallel with the leader. On the south the clay-slate is scattered with blende and galena. The ore, in fact, has a tendency to be scattered—a sign of coming poverty. Before the month was out the lode came into soft country ("cross-measures,") striking almost north and south. The latter not only strongly deviated the lode southwards, but, as might be expected, caused great sterility in it.[17]

IV.—CONCLUSIONS.

The useful bearing of the lode appears to be about E. 10° N., and the dip S. 75 to 80°. When coursing from 5° to 10° S. of E. the lode is usually marked by poverty, the dip then being often in an opposite direction or N. 80°.

The variation in the strike and dip is evidently due to change in the "hardness" of the country, extreme hardness and softness alike producing many degrees deviation from the normal direction,[18] which in this mine appears to be almost perpendicular to the present magnetic meridian. When the deviation is great, the metalliferous minerals are but sparsely scattered through the lode. When the "country" is soft the deviation is generally southwards, and when very hard in an opposite direction.

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[17] The effect of the soft measures on the lode was so curious that the author hopes to make it the subject of a short paper. When the cross measures gave out the lode became once more ore-bearing.

[18] This variation from the normal direction may be termed the *refraction* or the *bending* of the plane of the lode, resulting from the varying *resistance to fracture* of the rocks traversed.

The lode during a portion of its course—and oftener when the "country" is very hard than when it is soft—appears to consist of a series of small parallel fissures, which were most probably formed in the country rock at or about the same time. And if there be any evidence of movement in the lode it is entirely local,[19] and confined to certain portions of one or more fissures. The rock between the fissures is undisturbed, although sometimes impregnated with minerals. In such portions of the lode the ore appears to have been deposited by preference in or by the side of the fissure forming the walls of the lode. This does not necessarily imply that the ore was brought into the lode laterally, as each vein is to be regarded as coursing through the "country" independent of the rest.

Where the lode is richest the leader is on the north or foot-wall, the rest of the so-called "filling" being simply clay-slate traversed by parallel joints or partings, which dip variously, and which are sometimes curved, and sometimes coated with a little ore or gangue. These longitudinal joints are the representatives of the crystalline quartz veins of the harder portions of the lode.

It is not within the province of this essay to enter into theoretical considerations on the origin of this or similar metalliferous veins, but it is hoped that these observations may add somewhat to our practical knowledge of the Cardiganshire lodes, notwithstanding the simplicity of their structure and phenomena as compared with those of the far more important district of Cornwall.

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[19] "That movements are often local appears also from the fact that some slides only appear to have a certain vertical range, not appearing at the surface, or at great depths." W. J. HENWOOD, *Metall. Dep. of Cornwall*, p. 311.

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* The north joint only.

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TABLE II. *(Continued.)*

DATE	STRIKE	DIP	WIDTH	STRUCTURE OR CONTENTS	PRICE PER FATHOM	NO. ON PLAN	REMARKS
1882 Sept. 15				Ore scattered in veins. See diagram 3.			Ground very hard, little ore.
,, 16	E W * E 10° S † E 7½° N			N-side—leader of galena and blende 6 inches thick. See diagram 4.	£6	13	Ground hard, more favourable for galena, leader widens eastward.
,, 23				See diagram 5.		14	Lode improved.
Oct. 2				See diagram 6.		15	
1883 Feb. 1				See diagram 7.		16	Leader in one place 15 inches.
,, 15				Ore more scattered.			Lode has a good deal of galena.
April 2				Lode has a good deal of blende, ore more scattered.			
May 2	E W or 1° or 2° N of E (?)			15 inches of galena & blende scattered through clay-slate, with friable quartz on the north wall. See diagram 8.			
,, 15	E 6° S			More galena. (?)			Ground too brittle and soft.
,, 22				The ore at the top of the level is arranged perpendicularly to the main leader, or like the figure 7.			"Cross-measures" came in. Subsequently the lode became almost dead as long as the cross-measures continued, the leaders being traceable only as joints coated with a little ore and gangue.

* The N-joint. † Three joints near the south wall.

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Miss A. R. Tregelles (*Florence Terrace*)	1	0	0
Mr. Robert Tweedy	1	0	0
Mr. J. E. Veale	1	0	0
Rev. C. P. Apthorp, M.A.	0	10	6
Mr. J. J. Beringer, F.G.S.	0	10	6
Mr. F. J. Bowles	0	10	6
Mr. R. H. Carter	0	10	6
Mr. J. P. Cregoe	0	10	6
Mr. J. Grose	0	10	6
Mr. Joseph R. Holmes	0	10	6
Mr. W. F. Newman	0	10	6
Mr. W. H. Solomon	0	10	6
Rev. J. H. P. Bennett, M.A.	0	10	0
Rev. J. S. Flynn, M.A.	0	10	0
Rev. C. R. Gardner	0	10	0
Mr. W. J. Genn	0	10	0
Mr. R. Hardy	0	10	0
Lieut. Harvey, R.N.	0	10	0
Mr. J. B. Hodgkin	0	10	0
Rev. F. R. Hole, M.A.	0	10	0
Rev. George Mather, F.L.S.	0	10	0
Rev. A. Nicholls	0	10	0
Rev. J. Holford Scott, B.A.	0	10	0
Misses Tregelles (*Northbrook Place*)	0	10	0

	£	s.	d.
Mr. G. F. Tregelles	0	10	0
Mr. W. Tolmie Tresidder	0	10	0
Mr. Silvanus Trevail	0	10	0
Mrs. Williams (*Pencalenick*)	0	10	0
Miss Boulderson (*Florence Place*)	0	5	0
Mr. Wm. Brooks	0	5	0
Rev. W. Iago, M.A.	0	5	0
Herbert W. Smyth	0	5	0
Neville M. Smyth	0	5	0
Collection at the Foundation Stone Laying	11	12	0

Amount required for Land and Building, about £1,300.

Amount promised as above, £668.

Donations to be paid to the Cornish Bank, Limited; to Messrs. Williams, Williams, & Grylls; to the Devon & Cornwall Bank; or to Mr. E. Kitto, F. R. Met. Soc., Secretary Royal Cornwall Polytechnic Society, Falmouth.

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Treasurer in Account with Art Union.

Dr. 1884. Cr.

	£	s.	d.		£	s.	d.
To Balance from 1883	4	17	8	By paid Earle for printing Tickets and Advertising	1	1	6
,, 912 Tickets	45	12	0	,, Lake for Advertising		9	3
,, Commission from Artists	2	16	11	,, Stationery, Postages, Stamps	1	5	0
,, ,, ,, Prize Holders ...	1	5	0	,, Commission to Agents	2	11	4
				,, Prizes	46	0	0
				,, Balance	3	4	6
	£54	11	7		£54	11	7
To Balance to next year	£3	4	6				

Signed,—GEO. LANYON, *Chairman.*

E. KITTO, *Hon. Manager.*

W. W. J. SHARPE, *Hon. Secretary.*

Report of the Art Union of Cornwall, 1884.

The Committee have to report that the Annual Drawing took place on the 15th August, at 9 p.m., in the Polytechnic Hall, Falmouth, Mr. R. Fox in the Chair.

The ticket books were checked by Messrs. Fox, Downing, and G. Lanyon, and the tickets by Messrs. Anderton and Turner, and again by the whole of the Committee.

The value of the tickets sold amounted to £45 12s. od., which with the balance of £4 17s. 8d., made a total of £50 9s. 8d., of which it was resolved to apportion £46 os. od. for prizes.

The value of the Works of Art chosen as prizes was £56 5s. od.

The tickets were drawn from the wheels by Misses Cox & Kitto.

The following is the list of Winners in the Art Union Drawing:—

Nos.		£	s.	d.
935	Mrs. Kitto, Falmouth Observatory	2	0	0
1068	Mrs. Liddicoat, Falmouth	3	0	0
342	Mr. Robert Fox, Falmouth	5	0	0
961	Mr. James Still, Tintagel	2	0	0
748	Miss Steele, Falmouth	3	0	0
487	Mr. R. B. Brett, M.P., London	2	0	0
1085	Rev. Wm. Rogers, Mawnan	5	0	0
954	Mrs. Harris, London	3	0	0
1461	Mr. R. B. Brett, M.P., London	10	0	0
991	Mr. F. Spry, Falmouth	5	0	0
1486	Mr. C. E. Ruce, Truro	3	0	0
1500	Miss Katie Lake, Falmouth	1	0	0
96	Mr. D. J. Jenkins, M.P., London	1	0	0
1086	Rev. Wm. Rogers, Mawnan	1	0	0

List of Donors & Subscribers,

1884.

Donors.

Her Most Gracious Majesty the QUEEN, Five Pounds.
His Royal Highness the PRINCE of WALES, Five Pounds.

Subscriptions from Mines.

	£	s.	d.
The Mellanear Copper Mine Company	2	2	0
Pontgibaud Mining and Smelting Company	2	0	0
The Linares Lead Mining Company	1	1	0
The Alamillos Company	1	1	0
The Fortuna Company	1	1	0

Subscribers in the County of Cornwall.

Those marked with an asterisk are Members of the Committee.

	£	s.	d.
Anderton, E. D.,** ***Falmouth............	0	10	0
Anderton, Mrs., ***do.***	0	10	0
Aylmer, Major-General, ***do.***	1	0	0
Banks, E., ***do.***	0	5	0
Banks, Mrs., ***do.*** ...	0	5	0
Banks, W., ***do.***	0	5	0
Banks, J. R., ***Penryn***	0	10	0
Barclay, J., ***Falmouth***	0	10	0
Barclay, Miss, ***Meudon***	1	1	0
Barham, C., M.D.,** ***Truro	0	10	0
Barham, Rev. F. C., ***Mabe***	0	10	0
Basset, G. L.,** ***Tehidy	1	1	0
Batting, Mrs. Norman, ***Falmouth*** ...	0	5	0
Beauchamp, E. B.,** ***Trevince	0	10	0

	£	s.	d.
Bennett, Rev. J. H. P., M.A., *Falmouth*	0	5	0
Bennett, Mrs., *do*	0	5	0
Bennett, Miss, *do*.	0	5	0
Bennetts, J. P., *do*.	0	10	0
*Bennetts, S., *do*.	0	10	0
*Bolitho, T. S., *Penzance*	1	1	0
Bolitho, W., jun., *do*.	0	10	0
Bolitho, T. R., *do*.	1	0	0
*Borlase, W. Copeland, M.A., M.P., *do*.	0	10	0
Boulderson, Miss, *Falmouth*	0	5	0
*Bowles, F. J., *do*.	0	10	0
Bowles, Mrs., *do*.	0	5	0
Broad, R. R., *do*.	0	10	0
Broad, Sydney, *do*.	0	5	0
Broad, Mrs S., *do*.	0	5	0
Broad, Miss, *do*.	0	5	0
Broad, Miss G., *do*.	0	5	0
Broad, William, *do*.	0	10	0
Broad, Mrs. Wm., *do*.	0	5	0
Broad, Herman U. *do*.	0	5	0
Brown, Miss Ellen, *do*.	0	5	0
Brown, Miss Sarah R., *do*.	0	5	0
*Bull, Rev. G. T., M.A., *Camborne*	0	10	0
Bull, M. V., *Roscarrack, Falmouth*	0	10	0
Bull, Mrs., *do*.	0	5	0

	£	s.	d.
Bullmore, W. K., M.D., *Falmouth*	0	10	0
Bullmore, Ernest, *do*.	0	10	0
Buller, J. F., *Morval, Liskeard*,	2	2	0
Cardew. Mrs., *Falmouth*	0	5	0
*Carew, W. H. P., *Antony, Devonport*	1	0	0
*Carlyon, Rev. C. W., *St. Just*	0	10	0
Carne, E. C., *Falmouth*	0	10	0
Carne, Miss, *do*.	0	5	0
*Carne, W. Naylor, *St. Agnes, Scorrier*	0	10	0
Carne, Mrs. W. N., *do*.	0	5	0
Carne, Miss, *Penzance*	1	0	0
Carne, Mrs. Fred., *Falmouth*	0	5	0
*Carter, R. H., *do*.	0	10	0
*Carter, R., *do*.	0	5	0
Carter, Miss, *do*.	0	5	0
Carter, Ben., *do*.	0	5	0
*Clift, Mrs., *do*.	0	5	0
Cox, Henry, *do*.	0	10	0
Cregoe, J. P., *do*.	0	5	0
Cregoe, Mrs., *do*.	0	5	0
Cregoe, Archie, *do*.	0	5	0
Christoe, W. H., *do*.	1	0	0
Cuttance, E., *do*.	0	10	0
Dash, Miss, *do*.	0	5	0
Daubuz, J. C., *Carvedras, Truro*	1	0	0

	£	s.	d.
Davidson, C., *Falmouth*	0	5	0
Davidson, Mrs., *do.*	0	5	0
Davidson, Miss, *do.*	0	5	0
Downing, Mrs. J.V., *do.*	0	5	0
Downing, S. T. G., *Penzance*	0	10	0
Earle, F.H., *Falmouth*	0	10	0
Enys, F. G., *Enys*	2	2	0
*Falmouth, Right Hon. Viscount, *Tregothnan*	2	0	0
Field, T. W., *Marazion*	0	10	6
Fitz Gerald, Major-General C., *Falmouth*	0	5	0
Fitz Gerald, Mrs., *do.*	0	5	0
Fitz Gerald, J. C., *do.*	0	5	0
Fitz Gerald, C. M., *do.*	0	5	0
Foster, Richard, *Lanwithan*	0	10	0
*Fox, Miss, *Penjerrick, Falmouth*	1	0	0
Fox, Henry B., *Falmouth*	1	0	0
Fox, Mrs. Alfred, *do.*	0	10	6
*Fox, Alfred Lloyd, *Penmere, Falmouth*	1	1	0
Fox, Mrs. A. L, *do.*	0	10	6
*Fox, George H., *Falmouth*	0	10	0
Fox, Mrs. G H., *Falmouth*	0	5	0
*Fox, Howard, *do.*	1	0	0
Fox, Mrs. H., *do.*	0	5	0
*Fox, Nathaniel, *do.*	0	10	0
*Fox, Robert, *do.*	1	0	0
*Fox, Mrs. R., *do.*	0	5	0
*Fox, Wilson L., F.R.Met.Soc., *do.*	0	10	0
Fox, Mrs. W. L., *do.*	0	5	0
*Fox, G. C., *do.*	0	5	0
*Fox, Mrs. G. C., *do.*	0	5	0
Fox, G. C., jun., *do.*	0	5	0
Francis, Miss, *do.*	0	5	0
*Francis, Miss A., *do.*	0	5	0
Freeman, Miss H.D., *do.*	0	5	0
Freeman, Miss A. J., *do.*	0	5	0
Freeman and Sons, Messrs. John, *Penryn*	2	2	0
*Gardner, Rev. C.R., *Falmouth*	0	10	0
Genn, W. J., *do.*	0	5	0
*Genn, Mrs., *do.*	0	5	0
Genn, Miss, *do.*	0	5	0
Genn, Miss J., *do.*	0	5	0
Gilbert, Hon. Mrs., *Trelissick*	1	0	0
Gill, John, *Penryn*	0	10	0
Glencross, Rev. J., *Liskeard*	0	10	0

	£	s.	d.
*Grylls, W. M., *Falmouth*	0	10	0
Grylls, Mrs., *do*	0	5	0
Grylls, Miss, *do.*	0	5	0
Guppy, T. Stokes, M.D., *do.*	1	0	0
Harris, A. B., M.D., *do.*	0	5	0
Harris, Mrs., *do.*	0	5	0
Harris, Miss, *do.*	0	5	0
Harris, F. M., *do.*	0	10	0
*Hart, Thomas, F.S.A., *Lizard*	0	10	0
Harvey, Robert, *Trewin, Truro*	0	10	0
Haslope, L., *Falmouth*	0	10	6
Haslope, Mrs., *do.*	0	10	6
Haye, Major John, *Redruth*	0	10	6
Heard, E. G., *Truro*	0	10	0
Henderson, Capt. J., *do.*	0	10	0
Hill, F. V., *Helston*	0	10	0
Hockin, G. C., *Hayle*	1	0	0
*Hole, Rev. F. R., *Constantine*	0	10	0
*Hole, Mrs., *do.*	0	5	0
Holman, J., *Camborne*	0	10	0
Hooper, W., *Falmouth*	0	5	0
Hooper, Mrs., *do.*	0	5	0
Hooper, Miss, *do.*	0	5	0
Hosking, Capt. J., *Camborne*	0	10	0
*Husband, W., *Hayle*	1	0	0
Hugoe, Mrs., *Falmouth*	0	5	0
Hustler, Miss, *Trebah*	0	10	0
*Jago, J., M.D., Oxon., F.R.S., *Truro*	0	10	0
Jeffery, Henry M., M.A., F.R.S., *Falmouth*	0	10	0
*Kennerley, J. C., *St. Mawes*	1	1	0
Kinsman, J. K., *Antron, Mabe*	0	10	0
Lake, Mrs. J. H., *Falmouth*	0	5	0
Lake, Miss, *do.*	0	5	0
Lake, Miss Julia, *do.*	0	5	0
*Lanyon, G., *do*	0	5	0
Lanyon, Mrs., *do.*	0	5	0
Lanyon, Miss, *do.*	0	5	0
Lavin, Michael, *Penryn*	0	10	0
Lean, W. H., *Falmouth*	0	10	0
Liddell, J., R.N., *Bodmin*	0	10	0
*Mackenzie, H. S., *Falmouth*	0	10	0
Mackenzie, Mrs., *do.*	0	5	0
Mackenzie, Miss, *do.*	0	5	0
Martin, S. Symons, *Trenant, Sladesbridge*	0	10	

	£	s.	d.
Mayne, Rev. James, *Falmouth*	0	10	0
Mayne, Mrs., *do.*	0	5	0
Mayne, Miss, *do.*	0	5	0
Michell, G. A., *Redruth*	0	10	0
Mount Edgcumbe, Rt. Hon. Earl of, *Mount Edgcumbe*	2	2	0
Oatey, Thos. Hy., *Falmouth*	0	10	0
*Olver, W. S., *do.*	0	10	0
Olver, Mrs. W. S., *do.*	0	5	0
Olver, T. R., *do.*	0	15	0
Olver, Mrs., *do.*	0	5	0
*Pendarves, W. Cole, *Pendarves*	1	1	0
Pender, Mrs. Geo., *Falmouth*	0	5	0
Pender, W. R. T., *do.*	0	10	0
Peters, Miss, *Belair, Penzance*	0	5	0
Tonkin, Mrs., *do.*	0	5	0
*Phillips, Charles, *Falmouth*	0	10	0
Phillips, Mrs. C., *do.*	0	5	0
Phillpotts, Miss H. C., *St. Gluvias Vicarage, Penryn*	0	5	0
*Phillpotts, Rev. Canon, *Porthgwidden, Truro*	1	0	0
Philp, J. G., *Falmouth*	0	5	0

	£	s.	d.
Philp, Mrs., *Falmouth*	0	5	0
Philp, Hastings, *do.*	0	5	0
*Pollard, Henry, *do.*	0	5	0
*Poole, J., *Hayle*	0	10	0
Rashleigh, J., *Menabilly, Par*	1	1	0
Rashleigh, Evelyn W., *Kilmarth, Par Station*	0	10	0
Read, J. B., *Penryn*	0	10	0
Read, Mrs., *do.*	0	5	0
Read, Thomas, *Falmouth*	0	10	0
Reed, Com. G. H. B. *do.*	0	10	0
Rich, Capt. W., *Redruth*	0	10	0
*Robartes, Right Hon. Lord, *Lanhydrock*	1	1	0
*Rogers, Mrs. J. J., *Lamorra, Falmouth*	1	0	0
Rogers, Mrs. R., *Carwinion, Falmouth*	0	10	6
Rogers, John, *do.*	0	5	0
Rogers, R. N., *Falmouth*	0	10	0
Rogers, Mrs. R. N., *do.*	0	5	0
*Rogers, Rev. W., M.A., *Mawnan*	1	0	0
Rogers, Mrs. W., *do.*	0	5	0

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***Rogers, Rev. Canon, M.A.,** *Gwennap* ...	0	10	0
*Ross, C. C., M.P., *Penzance*	1	1	0
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Sara, N., *do.*	0	10	0
Savary, Datzel T.T., *do.*	0	10	0
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Scott, Mrs. W.T., *do.*	0	5	0
Sheriff, J. D., C.E., *Truro*	1	1	0
Shilson, Mrs., *Tremough*	0	10	0

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*St. Aubyn, Lady Elizabeth, *St. Michael's Mount*...	1	0	0
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Sterling, Miss, *The Crag, Falmouth* ..	1	1	0
Sterling, Miss H., *do.*	1	1	0
*Stephens, J., *Ashfield, Falmouth* ...	0	10	0
Stephens, Mrs. J., *do.*	0	5	0
Stephens, Miss, *do.*	0	5	0
Stephens, J. G., *do.*	0	5	0
Stephens, Miss Mary, *Falmouth*...........	0	5	0
Stevens, M., *do.*......	0	10	0
udden, J., *do.*.......	0	5	0
n, Mrs., *do.*....	0	5	0
Miss, *do.*....	0	5	0
rry, *do.*	0	5	0
H., den, H. ..	0	10	6
*Taylor, G.	0	10	0
Devoran .... *do.*	0	5	0
Tellam, R. V., Bodmin .... ions, des- a..........	0	10	0
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*Tregelles, Miss A., *do.*	0	5	0
Tregelles, Miss Anna R., *do*	0	5	0
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Trethowan, H. S., *Falmouth*	0	10	0
Trevenen, Miss, *do.*	0	5	0
Trevenen, Miss F., *do.*	0	5	0
Trevenen, Miss R., *do.*	0	5	0
*Tweedy, R. M., *do.*	0	5	0
*Tweedy, Mrs., *do.*	0	5	0
Tweedy, Miss, *do.*	0	5	0

	£	s.	d.
Tweedy, Arthur C., *Falmouth*	0	5	0
*Vyvyan, Rev. Sir Vyell, Bart., *Trelowarren, Helston*	1	0	0
*Vivian, A. P., M.P., *Bosahan*	2	2	0
Waters, Mrs., *Holyrood, Falmouth*	0	5	0
*Webber, T., *Falmouth*	0	10	0
Williams, Mrs., *Pengreep, Redruth*	2	2	0
Williams, Michael Henry, *Pencalenick, Truro*	0	10	0
Williams, George, *Scorrier House*	1	0	0
*Willmore, A., *Falmouth*	0	10	0
Willmore, Mrs., *do.*	0	5	0
Wymer, F. W., *do.*	0	5	0
Wymer, Mrs., *do.*	0	5	0
Wymer, D. W., *do.*	0	5	0

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*Brooks, William, *Reigate*	0	10	0
Collins, J. H., F.G.S. *London*	0	10	0
Courtney, Leonard, M.P., *do.*	1	0	0
Dymond, F. W., *Exeter*...............	0	10	0
Everard, Mrs., *Eton*	0	5	0
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*Fox, Francis E., B.A., F. R. G. S., *Tamerton*............	0	5	0
Fox, Mrs. F. E., *do.*	0	5	0
Fox, F. W., *do.*.......	0	5	0
Frecheville, R., F.G.S., *Plymouth*	0	10	0
Handcock, E., *Cardiff*	0	10	0
Hodgkin, Thomas, *Newcastle-on-Tyne*	1	0	0
Howard, Elliot, *Walthamstow*	0	10	0
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Jenkins, D. J., M.P., *do.*	2	2	0
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Olver, E. T., *do.*.......	0	10	0
Oxland, R., F.C.S., *Plymouth*............	0	10	0
Pease, Sir J. W., Bart., M.P., *Hutton Hall, Guisbro'* ...	0	10	0
Pease, John William, *Newcastle-on-Tyne*	0	10	0
Pease, Mrs., *do.* ...	0	5	0
Pease, Miss S. H., *do.*	0	5	0
Smyth, W. W., M.A., F.R.S., *London* ...	1	0	0
St. Aubyn, Walter M., M.P., *London*	1	1	0

	£	s.	d.
Tuckett, F. F., *Frenchay, Bristol*	1	0	0
Tuckett, P. D., *London*	0	10	0
Tuckett, Mrs. P. D., *do.*	0	10	0
Vivian, Ed., M.A., *Torquay*	0	10	0
Williams, Michael, M.A., *Gnaton Hall, Yealmpton, S. Devon*	1	1	0
X.Y.Z.	2	2	0

TABLES

OF

SEA TEMPERATURE, BRIGHT SUNSHINE

AND

CLIMATE AT FALMOUTH,

FOR THE YEAR 1884,

AND

NOTES

BY

WILSON LLOYD FOX, F.R. MET. SOC.

WITH OTHER

METEOROLOGICAL TABLES

FOR WEST CORNWALL

AND

THE SCILLY ISLANDS.

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SEA TEMPERATURE. The Table below contains the particulars of the Sea Temperatures taken during eleven months of the year 1884 off Falmouth, in the steam-tug "Briton." The difference between these temperatures and those of the air will be found in the adjoining columns, expressed by + and — signs respectively. In the last column I have inserted the monthly mean temperature for the same eleven months, for the eleven years 1872 to 1882 inclusive. It will be seen that during 1884, the sea has been, on an average 1°·2 warmer than the mean of these eleven years. The unusually high temperature of the past year has therefore made itself felt in raising the temperature of the sea surrounding our shores, unless indeed the reverse is the case, and it were possible to prove that the extra temperature of the sea has been the main cause of the higher temperature on the land:

1884.	Number of Observations.	Means.	Difference from Air	Absolute Maximum.	Difference from Air.	Absolute Minimum.	Difference from Air.	Monthly mean Temperature 1872-1882
		°	°	°	°	°	°	°
February	18	48·6	+3.3	49·0	— 3·7	46·0	+12·0	47·2
March	25	49·2	+3·5	50·0	— 7·0	48·0	+11·8	47·7
April	20	49·7	+3·5	51·0	— 4·9	49·0	+12·4	49·4
May	24	52·4	—0·1	56·0	— 7·4	50·0	+ 8·0	52·2
June..................	25	56·7	—0·6	58·0	—13·3	55·0	+10·0	55·2
July	24	59·2	—1·4	62·0	— 7·9	57·0	+ 6·1	58·2
August	17	61·8	—0·3	63·5	—12·8	60·0	+ 8·3	59·7
September.........	21	60·3	+1·6	62·0	— 9·7	59·0	+10·3	59·0
October	27	57·3	+5·1	59·0	— 2·2	56·0	+15·1	56·6
November	23	54·4	+7·1	56·0	— 1·8	52·0	+15·7	52·9
December	27	51·1	+6·4	53·0	— 1·1	48·0	+15·4	49·5
Means..................	23	54·6	+2·3	56·2	— 6·0	52·9	+10·4	53·4

BRIGHT SUNSHINE. The table which follows contains the monthly amount of Sunshine, the greatest amount in one day, and the number of days on which any occurred during 1884, compared with the means for three years, 1881, 1882 and 1883. It will be seen, that except in July and August, the monthly sunshine has been below the mean of the three preceding years—this has occurred during twelve months which have been remarkable for their general fineness and particularly for the small rainfall. In 1881, when the number of hours of bright sunshine was 1847 (being the maximum amount for the past four years) the rainfall was 42·93 inches, whilst this year the number of hours has been 1534 or less than either of the three years preceding and the rainfall has been also less, viz. 37·67 inches, instead of greater, as might have been expected; so that judging by these results sunshine and rainfall instead of bearing an inverse ratio are relative.

1884	Number of hours of bright Sunshine.		Greatest amount in one day.		Number of days on which Sunshine occurred.	
	1884	1881-2-3 Means.	1884	1881-2-3 Means.	1884	1881-2-3 Means.
January	22·1	48·4	4·6	6·6	13	18
February	51·1	79·7	7·7	9·0	17	21
March	97·0	160·7	8·9	10·6	24	27
April	165·4	169·4	11·9	12·2	29	26
May	217·1	234·8.	13·1	14·0	29	28
June	235·7	241·7	13·6	14·7	30	28
July	214·1	200·6	13·4	14·0	29	30
August	216·7	190·1	13·0	12·6	30	29
September ...	139.4	153·5	9·2	11·4	29	27
October	104·0	118·1	9·7	9·8	27	26
November ...	45·0	80·9	6·6	7·4	21	21
December......	26·9	52·0	5·1	7·5	12	18
Sums	1534·5	1729·9	116·8	129·8	290	297
Means	127·9	144·2	9·7	10·8	24	25

THE RAINBAND IN THE SPECTRUM.—I have continued the observations begun on the first of September, 1883, throughout 1884. They have been taken at 9 a.m. local time. The scale used has been:

0 = None
1 = Faint
2 = Moderate
3 = Strong
4 = Very strong.

A Summary of my observations will be found in the following table:

1884	Rainband.	Rainfall in Inches.
January	40	5·065
February	52	5·225
March	46	4·190
April....................	28	1·935
May	38	1·365
June	29	1·350
July	41	3·990
August.................	26	1·835
September	36	3·080
October	32	1·960
November	32	2·605
December	41	5·095
Sums....................	441	37·695
Means	37	3·141

The next is a table of the Climatological observations taken at Carmino in the form in which they appear in the Meteorological Record—The Thermometers are placed in a Stevenson screen at a height of four feet over grass, and are divided on the stem and verified. The rainfall is from the eight-inch copper rain gauge belonging to the Meteorological Council, which is fixed by the kind permission of Mr. Philp, in his garden at Woodlane. The rain is measured at 10 a.m. and with the maximum temperature is entered to the previous day.

1884	Means at 9 a.m.		TEMPERATURE.							Mean amount of Cloud at 9 a.m.	RAIN	
			MEANS				Extremes in Month.					
	Tem.	Rel. Hdy.	Min.	Max.	Rnge.	Mns.	Min.	Max.	Rnge.		Amnt.	No of days
Jan. ...	47·4°	87	43·8°	50·5°	6.7°	47·2°	33·7°	55·0°	21·3°	8·6	5·07	23
Feb. ...	45·7	87	41·8	49·2	7·4	45·5	31·7	53·4	21·7	8·3	3·23	20
March.	47·1	80	42.1	50·6	8·5	46·3	35·6	57·7	22·1	7·7	4·19	21
April...	46·4	73	41·8	51·6	9·8	46·7	36·1	56·7	20·6	6·6	1·94	13
May ...	54·0	75	47·9	58·1	10·2	53·0	40·4	64·8	24·4	6·3	1·36	11
June...	59·8	76	51·4	64·6	13·2	58·0	43·2	73·4	30·2	6·0	1 35	10
July ...	62·2	79	55·5	65·6	10·1	60·6	48·0	69·9	21·9	7·2	3·99	24
Aug....	64·4	78	56·7	68·8	11·6	62·5	49·8	76·0	26·2	5·9	1·83	12
Sept....	61·1	81	54·7	64·6	9·9	59·6	45·7	73·6	27·9	6·2	3·09	18
Oct. ...	53·7	80	48·3	57·2	8·9	52·7	40·2	62·5	22·3	6·7	1·96	19
Nov....	47.5	85	44·0	51·1	7·1	47·5	35·2	59·0	23·8	7·8	2·61	19
Dec....	45·1	83	41·2	48·7	7.5	44·9	32·1	55·2	23·1	8·7	5·09	22
Means	53·0	80	47·4	56·7	9·2	52·0	39·3	63·1	23·8	7·2	37·67	18

MISCELLANEOUS. The year 1884 has been remarkable in several respects. Some of the most notable are as follows: In January there was an extraordinarily low barometer recorded in the North of Scotland, where it is reported to have read on the 26th at Aberdeen, 27·381 inches reduced to 32° at sea level, and at some other places in that district, even lower readings were made, which are respectively the lowest minima ever recorded in the British Isles. A remarkable feature of this depression, which was naturally accompanied by a great storm, was its suddenness, and the subsequent rise of the barometer was similarly rapid. At Falmouth the minimum was 28·618 inches, and the maximum velocity of the wind (which blew from the S.S.W.) during one hour was 63 miles, being the highest velocity attained during the year. Considerable damage was done in exposed places. The month of January was also noteworthy from its general and unusual mildness. Its mean temperature at Falmouth was 46°8 being 1°·3 higher than that of the mean of the previous December, and the following February, March and April, notwithstanding that all of these months (except April which was exceptionally cold) were milder than usual. The temperature was 2°·4 higher than the mean January temperature of the 10 years 1870 to 1879.

The greatest rainfall of the year occurred in February and was 5·64 inches. In November, one of the wettest of months, it was only 2·57.

Between the 14th and 19th of March, inclusive, there was a spell of unusually warm weather. The maximum recorded at Carmino was 57°·7 whilst the mean of the maxima during these six days was 55°·5 or 9°·8 above the mean of the daily maxima for the month.

Mr. E. G. Aldridge, of London, in a letter to the *Marlborough Times* of the 3rd of May, 1884, pointed out that a mild winter, followed by a mild March, was almost certain to be succeeded by a fine hot summer. This has been the case as the Summer and Autumn have been exceptionally fine, and it is seldom that a drought has been so universal and continuous as during these seasons.

On the 22nd of April, there were several violent shocks of Earthquake in the East of England, attended with loss of life and considerable destruction of property, including several churches and houses. These shocks, however, sink into insignificance when compared with those which occurred in Spain on the 27th of December and subsequent dates. These were very severe and continuous, and caused an appalling loss of life and a great amount of damage.

TABLE No. 1. WEST CORNWALL AND SCILLY ISLANDS, 1884.

Date.	PRESSURE OF AIR.						TEMPERATURE OF AIR.									WIND.				HYGROMETRIC CONDTN							RAIN.	
1884.	Mean pressure of the atmosphere.	Maximum pressure observed.	Date of Maximum	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean temp. of the air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Mean monthly range	Relative proportion of N	E	S	W	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean diff. between Dew point and air.	Mean Humidity Comp. Satn.=100.	Mean weight of vapour in cubic ft. of air	Mean additional weight of vapour required to saturate cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	Number of Rainy Days.
	in.	in.		in		in.	°	°	°	°	°		°							°	°	°		grs.	grs.	grs.		
Bodmin . .	29·986	30·650	1—15	28·370	1-26	·322	52·5				78·0	8-24	27·0	12-29	27·5	61	64	122	119	49·7	46·9	5·6	82	3·66	0·84	541·9	43·64	213
Truro . . .	29·998	30·663	10—5	29·011	4-2	·316	51·9	59·4	45·2	14·3	82·0	8-23	26·0	2- 3	33·8	76	62	93	135	48.9	45·9	6·0	81	3·60	0·90	542·8	32·63	178
Falmouth	30·014	30·685	1—15	28·618	1-26	·315	51·6	55·9	47·9	8·0	75·3	8-11	32·6	12-27	21·1	81	57	100	128	48·7	45·8	5·8	81	3·57	0·88	543·4	39·30	230
Helston *	30·041	30·662	1—15	28·500	3-29	·331	52·2	58·4	47·7	10·7	76·9	8-11	32·5	3-11	27·2	90	63	84	100	50·0	47·7	4·5	86	3·83	0·72	543·0	24·53	164
Scilly . . .	29·981	30·620	1—15 10—5	29·120	4-5	·345	53·1	56·3	48·9	7·4	72·0	8- 8	34·0	2- 3	19·1	83	66	100	117	53·7	48·4	4·7	84	3·90	0·75	540·9	28·22	217
Means . .	30·077	30·656		28·790		·326	52·3	57·5	47·4	10·1	76·8		30·4		25·7	78	64	160	120	49·6	46·9	5·4	83	3·71	0·82	542·4	33·66	209

*The data from Helston are with the exception of rainfall for eleven months only.

TABLE No. 2.—FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″W

DATE.	PRESSURE OF AIR.										TEMPERATURE OF AIR.										
1884.	Mean pressure of the atmosphere.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Maximum pressure recorded.	Date of Max.	Minimum pressure recorded.	Date of Min.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Absolute Max.	Absolute Minimum.	Date of Absolute Min.	Monthly range	Temperature of the SEA.
	In.	In.	In.	In.	In.		In.		In.	In.	°	°	°	°	°		°		°	°
Jan.	30·155	30·256	30·038	·218	30·685	15	28·618	26	2·067	·268	46·8	49·7	44·3	5·4	54·1	4	34·2	27	19·9	
Feb.	29·850	29·956	29·757	·199	30·579	3	29·180	1	1·399	·255	45·3	48·5	42·4	6·1	52·7	9	36·0	2	16·7	48·6
Mar.	29·908	29·996	29·811	·185	30·331	5	29·145	10	1·186	·246	45·7	49·7	42·8	6·9	57·0	17	36·2	11	20·8	49·2
April	29·811	29·866	29·751	·115	30·136	14	29·071	4	1·065	·243	46·2	50·4	42·3	8·2	55·9	7	36·6	18	19·3	49·7
May	30·028	30·099	29·949	·150	30·431	21	29·495	3	·936	·307	52·5	57·3	48·1	9·2	63·4	24	42·0	1	21·4	52·1
June	30·100	30·148	30.040	·108	30·366	15	29·549	2	·817	·366	57·3	63·5	51·9	11·6	71·3	22	45·0	7	26·3	56·7
July	29·970	30·037	29·907	·130	30·249	30	29·545	10	·704	·433	60·6	65·4	56·2	9·2	69·9	6	50·9	26	19·0	59·2
Aug.	30·032	30·091	29·974	·117	30·289	4	29·658	31	·631	·439	62.1	67·6	57·3	10·3	75·3	11	51·7	26	23·6	61·8
Sept.	30·030	30·100	29·937	·163	30·371	18	29·443	6	·928	·400	58·7	63·1	54·8	8·3	71·7	17	48·7	30	23·0	60·3
Oct.	30·158	30·241	30·063	·178	30·679	5	29·325	9	1·354	·315	52·2	56·3	48·9	7·4	61·2	2	40·9	10	20·3	57·3
Nov.	30·186	30·276	30·097	·179	30·594	19	29·683	7	·911	·263	47·3	50·9	44·2	6·7	57·8	5	36·3	18	21·5	54·4
Dec.	29·942	30·072	29·810	·262	30·316	21	29.079	20	1·237	·242	44·7	48·1	41·7	6·4	54·1	7	32·6	27	21.5	51·1
Means	30·014	30·095	29.928	·167	30·419		29·316		1·103	·315	51·6	55·9	47·9	8·0	62·0		40·9		21·1	54·6

N.B.—The Instruments at Falmouth belong to the Meteorological Council, with whose permission the results are published.

TABLE No. 3.—FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″ W.

DATE	WIND.										HYGROMETRICAL CONDITION.									DATE.
1884.	Relative proportion of				Mean velocity in miles per hour.	Max. velocity during one hour.	Day and hour of Max. velocity.	Direction of Max. velocity.	Mean pressure in lbs. per sqr. foot.	Maximum pressure.	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean difference between dew point & air.	Mean Humidity Complete saturation =100.	Mean weight of vapour in a cubic foot of air.	Mean weight vapour required to saturate a cubic foot of air.	Mean weight of a cubic foot of air.	RAIN.	No. of rainy days.	1884.
	N	E	S	W																
					miles.	miles.			lbs.	lbs.	°	°	°		gr.	gr.	gr.	in.		
Jan.	5	1	11	14	19·0	63	26th; 3 p.m.	SSW	1·8	19·9	44·6	42·1	4·7	84	3·06	0·62	551·2	5·245	25	Jan.
Feb.	2	7	13	7	21·8	58	20th, 10 p.m.	S	2·4	16·9	43·2	40·8	4·5	84	2·91	0·55	547·4	5·640	23	Feb.
Mar.	5	5	11	10	16·6	46	4th, 2 p.m. 31st, 9 p.m.	NW by N S by E	1·4	10·6	43·0	39·9	5·8	81	2·83	0·71	548·2	4·360	24	Mar.
April	6	11	9	4	14·0	40	18th 8 a.m.	NE by E	·98	8·0	43·1	39·6	6·6	79	2·81	0·81	545·8	2·105	14	April
May	6	6	9	10	16·4	39	1st, 1 p.m. 15th, 11 a.m.	SW by W SW	1·3	7·6	49·1	45·7	6·3	79	3·48	1·02	542·7	1·440	11	May
June	12	1	2	15	12·9	33	1[illegible]th, 7 a.m.	NNW	·83	5·4	53·7	50·4	6·9	78	4·08	1·18	538·6	1·405	13	June
July	4	4	11	12	14·5	31	15th, 10 a.m.	S by W	1·0	4·6	57·6	55·0	5·6	83	4·88	1·04	532·4	4·245	24	July
Aug.	6	6	8	11	11·5	41	25th, 10 a.m.	N	·66	6·4	58·5	55·4	6·7	79	4·89	1·33	531·8	1·905	12	Aug.
Sept.	5	6	8	11	13·2	35	6th, 3 p.m. 7th, 10 a.m.	SSW WNW	·86	6·1	56·6	52·8	5·9	82	4·44	1·10	535·6	3·120	20	Sept.
Oct.	13	2	3	13	14·6	42	27th 10 p.m. 29th, 11 a.m.	WSW W by S	1·0	8·8	49·3	46·3	5·9	81	3·57	0·67	546·4	2·185	22	Oct.
Nov.	9	6	7	8	16·3	38	4th, 8 p.m.	SW by S	1·3	7.2	44·6	41·6	5·7	81	3·05	0·68	551·5	2·570	20	Nov.
Dec.	8	2	8	13	+	+	+	+	+	+	42·3	39·5	5·2	82	2·79	0·58	549·9	5·065	22	Dec.
Means	81	57	100	128							48·7	45·8	5·8	81	3·57	0·88	543·4	39·305	230	means.

+ No record during December, Anemometer under repair.

TABLE No. 4—BODMIN. Latitude 50° 28′ 30″ N., Longitude, 4° 42′ 20″ W.

From Registers kept by COMMANDER J. LIDDELL, R.N.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.											RAIN.						REMARKS.
1884.	MEAN PRESSURE.	MAXIMUM PRESSURE OBSERVED.	Date.	MINIMUM Pressure observed	Date.	MEAN TEMPERATURE.	ABSOLUTE MAXIMUM.	Date.	ABSOLUTE MINIMUM.	Date.	MINIMUM on grass.	Date.	Mean temperature of 35 years.	Max. diff. between wet & dry bulbs.	Date.	mean differences of wet & dry bulbs.	Rain in Inches.	Number of rainy days.	Greatest rainfall.	Date	Mean rainfall of 35 years.	No. of Rainy days in 35 years	
	ins.	ins.		ins.		deg	deg		deg		deg		deg	deg		deg			ins.		ins.		
Jan.	30·13	30·65	15	28·67	26	45·9	53	23	33	27	30	13	42·2	5	23	1·8	5·23	23	0·77	26	5·29	22·4	A remarkably mild month,
Feb. .	29·79	30·50	3	29·26	1	43·0	53	9	29	3	25	3	43·1	4	29	1·7	7·77	23	1.82	17	3·88	18·6	No Winter yet.
March	29·89	30·22	6	29·06	9	45·5	58	16	33	11	27	11	44·4	6	36	2·7	5·14	16	1·29	3	3·30	18·7	We have really had no winter
April .	29·79	30·10	14	29·01	4	49·9	57	6	31	24	28	28	50·0	6	18	4·0	2·31	8	1·16	4	2·93	14·6	A remarkably cold dry month.
May .	30·01	30·40	21	29·53	3	56·7	73	24	38	22	30	22	55·7	9	22	4·7	1·29	11	0·28	7	2·77	13·7	Very dry, easterly winds.
June .	30·07	30·31	12	29·57	2	62·2	73	26	43	7	38	10	59·5	9	16	4·6	1·25	14	0·29	6	3·06	14·8	A hot, and very dry month.
July .	29·94	30·22	1	29·59	10	[illegible]·8	73	20	49	2	44	1	62·6	7	1	3·6	4·41	25	0·60	14	3·27	16·9	Rain, most welcome.
Aug. .	30·05	30·28	4	29·78	28	65·5	78	24	47	5	43	26	62·6	7	1	3·5	2·19	14	0·79	31	3·72	16·9	A very dry and warm month.
Sept. .	30·01	30·37	28	29·66	8	60·5	76	17	42	30	39	30	59·1	5	23	3·6	2·83	18	0·94	15	4·09	17·0	A remarkably fine month.
Oct. .	30·13	30·63	5	29·31	9	51·8	62	5	36	29	31	29	53·0	4	10	1·9	2·48	20	0·58	8	5·65	20·6	A remarkably dry & fine month
Nov. .	30·15	30·57	19	29·73	7	43·8	57	5	30	18	26	22	45·9	3	17	1·4	3·27	20	0.49	5	5·34	20·7	Another very fine month.
Dec. .	29·87	30·32	21	29·04	19	41·8	54	7	27	29	24	28	42·8	4	20	1·5	5·47	21	0·82	5	5·37	20·1	A very genial month.
means.	29·986	30·381		29·351		52·5	63·9		36·4		32·0		51·7	5.9		2·8	43·64	21·3			48·73	215·0	

REMARKS—Height of RAIN GAUGE above the sea. 315 feet, and above the ground one foot. Diameter of Gauge (Cassella's) 5 inches. Barometer reduced to sea-level and 32° of temperature. Thermometers are hung four-and-half feet above the ground (sheltered) and facing north.

The means are those of 35 years. The greatest rainfall 71·93 inches in 1872; the least, 33.15 inches in 1854. The greatest Barometric pressure, 30.95 inches on the 18th of January 1882: the least 28.06 inches on the 23rd of January, 1872, at 3 a.m.

WINDS.

North.........	21	East.........	21	N. East	24	S. East	61
South.........	41	West	41	N. West	56	S. West ...	99

TABLE No. 3.—FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″ W.

DATE	WIND.										HYGROMETRICAL CONDITION.									DATE.
1884.	Relative proportion of				Mean velocity in miles per hour.	Max. velocity during one hour.	Day and hour of Max. velocity.	Direction of Max. velocity.	Mean pressure in lbs. per sqr. foot.	Maximum pressure.	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean difference between dew point & air.	Mean Humidity Complete saturation = 100.	Mean weight of vapour in a cubic foot of air.	Mean weight vapour required to saturate a cubic foot of air.	Mean weight of a cubic foot of air.	RAIN.	No. of rainy days.	1884.
	N	E	S	W	miles.	miles.			lbs.	lbs.	°	°	°		gr.	gr.	gr.	in.		
Jan.	5	1	11	14	19·0	63	26th; 3 p.m.	SSW	1·8	19·9	44·6	42·1	4·7	84	3·06	0·62	551·2	5·245	25	Jan.
Feb.	2	7	13	7	21·8	58	20th, 10 p.m.	S	2·4	16·9	43·2	40·8	4·5	84	2·91	0·55	547·4	5·640	23	Feb.
Mar.	5	5	11	10	16·6	46	4th, 2 p.m. 31st, 9 p.m.	NW by N S by E	1·4	10·6	43·0	39·9	5·8	81	2·83	0·71	548·2	4·360	24	Mar.
April	6	11	9	4	14·0	40	18th 8 a.m.	NE by E	·98	8·0	43·1	39·6	6·6	79	2·81	0·81	545·8	2·105	14	April
May	6	6	9	10	16·4	39	1st, 1 p.m. 15th, 11 a.m.	SW by W SW	1·3	7·6	49·1	45·7	6·3	79	3·48	1·02	542·7	1·440	11	May
June	12	1	2	15	12·9	33	1[illegible]h, 7 a.m.	NNW	·83	5·4	53·7	50·4	6·9	78	4·08	1·18	538·6	1·405	13	June
July	4	4	11	12	14·5	31	15th, 10 a.m.	S by W	1·0	4·6	57·6	55·0	5·6	83	4·88	1·04	532·4	4·245	24	July
Aug.	6	6	8	11	11·5	41	25th, 10 a.m.	N	·66	6·4	58·5	55·4	6·7	79	4·89	1·33	531·8	1·905	12	Aug.
Sept.	5	6	8	11	13·2	35	6th, 3 p.m. 7th, 10 a.m.	SSW WNW	·86	6·1	56·6	52·8	5·9	82	4·44	1·10	535·6	3·120	20	Sept.
Oct.	13	2	3	13	14·5	42	27th 10 p.m. 29th, 11 a.m.	WSW W by S	1·0	8·8	49·3	46·3	5·9	81	3·57	0·67	545·4	2·185	22	Oct.
Nov.	9	6	7	8	16·3	38	4th, 8 p.m.	SW by S	1·3	7.2	44·6	41·6	5·7	81	3·05	0·68	551·5	2·570	20	Nov.
Dec.	8	2	8	13	+	+	+	+	+	+	42·3	39·5	5·2	82	2·79	0·58	549·9	5·065	22	Dec.
Means	81	57	100	128							48·7	45·8	5·8	81	3·57	0·88	543·4	39·305	230	means.

+ No record during December, Anemometer under repair.

TABLE No. 4—BODMIN. Latitude 50° 28′ 30″ N., Longitude, 4° 42′ 20″ W.

From Registers kept by COMMANDER J. LIDDELL, R.N.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.											RAIN.						
1884.	MEAN PRESSURE.	MAXIMUM PRESSURE OBSERVED.	Date.	MINIMUM Pressure observed	Date.	MEAN TEMPERATURE.	ABSOLUTE MAXIMUM.	Date.	ABSOLUTE MINIMUM.	Date.	MINIMUM on grass.	Date.	Mean temperature of 35 years.	Max. diff. between wet & dry bulbs.	Date.	mean differences of wet & dry bulbs.	Rain in Inches.	Number of rainy days.	Greatest rainfall.	Date	Mean rainfall of 35 years.	No. of Rainy days in 35 years	REMARKS.
	ins.	ins.		ins.		deg	deg		deg		deg		deg	deg		deg			ins.		ins.		
Jan.	30·13	30·65	15	28·67	26	45·9	53	23	33	27	30	13	42·2	5	23	1·8	5·23	23	0·77	26	5·29	22·4	A remarkably mild month,
Feb. .	29·79	30·50	3	29·26	1	43·0	53	9	29	3	25	3	43·1	4	29	1·7	7·77	23	1.82	17	3·88	18·6	No Winter yet.
March	29·89	30·22	6	29·06	9	45·5	58	16	32	11	27	11	44·4	6	26	2·7	5·14	16	1·29	3	3·36	18·7	We have really had no winter
April .	29·79	30·10	14	29·01	4	49·9	57	6	31	24	28	29	50·6	6	18	4·0	2·31	8	1·16	4	2·93	14·6	A remarkably cold dry month.
May .	30·01	30·40	21	29·53	3	56·7	73	24	38	22	30	22	55·7	9.	22	4·7	1·29	11	0·28	7	2·77	13·7	Very dry, easterly winds.
June .	30·07	30·31	12	29·57	2	62·2	73	26	43	7	38	10	59·5	9	16	4·6	1·25	14	0·29	6	3·06	14·8	A hot, and very dry month.
July .	29·94	30·22	1	29·59	10	[illegible]·8	73	20	49	2	44	1	62·6	7	1	3·8	4·41	25	0·60	14	3·27	16·9	Rain, most welcome.
Aug. .	30·05	30·28	4	29·78	28	63·5	78	24	47	5	43	26	62·6	7	1	3·5	2·19	14	0·79	31	3·72	16·9	A very dry and warm month.
Sept. .	30·01	30·37	28	29·66	8	60·5	76	17	42	30	39	30	59·1	5	23	3·0	2·83	18	0·94	15	4·09	17·0	A remarkably fine month.
Oct. .	30·13	30·63	5	29·31	9	51·8	62	2	36·	29	31	29	53·0	4	10	1·9	2·48	20	0·58	8	5·65	20·6	A remarkably dry & fine month
Nov. .	30·15	30·57	19	29·73	7	43·8	57	5	30	18	26	22	45·9	3	17	1·4	3·27	20	0.49	5	5·34	20·7	Another very fine month.
Dec. .	29·87	30·32	21	29·04	19	41·8	54	7	27	29	24	28	42·8	4	20	1·5	5·47	21	0·82	5	5·37	20·1	A very genial month.
means.	29·986	30·381		29·351		52·5	63·9		36·4		32·0		51·7	5.9		2·8	43·64	21·3			48·73	215·0	

REMARKS—Height of RAIN GAUGE above the sea. 315 feet, and above the ground one foot. Diameter of Gauge (Casella's) 5 inches. Barometer reduced to sea-level and 32° of temperature. Thermometers are hung four-and-half feet above the ground (sheltered) and facing north.

The means are those of 35 years. The greatest rainfall 71·93 inches in 1872; the least, 33.15 inches in 1854. The greatest Barometric pressure, 30.95 inches on the 18th of January 1882: the least 28.06 inches on the 23rd of January, 1872, at 3 a.m.

WINDS.

North.........	21	East.........	21	N. East	24	S. East......	61
South.........	41	West	41	N. West	56	S. West ...	99

TABLE No. 5. TRURO. Latitude, 50°.17′ N.; Longitude, 5 4′ 5″ W. From Registers kept at Royal Institution of Cornwall.

DATE.	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND				HYGROMETRIC CONDITION.								
1884.	Mean pressure of atmosphere.	Maximum pressure observed.	Date of Maximum.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean of Dry bulb.	Mean of daily maxima.	Mean of daily minima.	Mean temperature	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	Mean temperature of evaporation.	Mean temperature of dew point.	Mean diff. between dew point and air.	Humidity, complete satrn.=100.	Mean weight of vapour in cubic foot of air.	Mean additional weight of vapour required to saturate cubic ft. of air	Mean weight of cubic foot of air.	Rain in inches.	No. of Rainy days.
	in.	in.		in.		in.	°	°	°	°	°	°		°		°					°	°	°		grs.	grs.	grs.	in.	
Jan.	30·132	30·637	15	29·243	27	·283	47·7	51·8	43·4	47·5	8·4	56·0	9	34·0	27	22	4	3	9	15	45·7	43·5	4·2	87	3·2	0·6	549·9	3·81	18
Feb.	29·862	30·553	3	29·174	1	·254	45·0	50·8	39·9	45·2	10·9	55·0	14	26·0	3	29	2	6	12	9	43·0	40·7	4·3	85	2·9	0·5	547·9	5·35	21
March	29·907	30·327	5	29·237	9	·247	47·2	53·4	40·0	46·5	13·4	61·0	17	30·0	11	31	3	6	12	10	43·8	40·0	7·2	77	2·8	0·9	548·5	3·76	17
April	29·903	30·103	12	29·041	2	·246	46·0	55·7	38·5	47·1	16·9	62·0	9	27·0	25	35	6	11	9	4	43·6	39·9	7·0	78	2·9	0·8	544·9	1·66	8
May	30·027	30·425	21	29·520	3	·299	52·8	62·8	45·6	53·4	17·2	76·0	24	32·0	21	44	5	6	9	11	48·9	45·0	7·8	75	3·4	1·2	542·5	0·85	9
June	30·087	30·351	12	29·563	2	·358	56·3	67·4	49·9	58·3	17·5	75·0	26	43·0	1	32	13	1	3	13	52·9	49·8	6·5	79	4·0	1·0	539·5	1·68	10
July	29·954	30·229	30	29·586	10	·427	60·4	69·3	54·1	61·4	15·2	80·0	31	43·0	9	37	4	2	11	14	57·3	54·6	5·8	82	4·8	1·1	532·2	3·15	16
Aug.	30·014	30·260	4	29·651	31	·425	63·0	73·4	53·4	63·1	20·0	82·0	23	42·0	5	40	6	6	8	11	58·4	54·5	8·5	74	4·7	1·7	531·0	1·64	9
Sep.	30·006	30·346	18	29·434	6	·415	59·6	68·8	52·0	60·2	16·8	80·0	18	37·0	30	43	5	6	8	11	56·5	53·8	5·8	82	4·6	1·1	534·2	1·89	3
Oct.	30·123	30·663	5	29·320	9	·322	52·3	58·9	45·8	51·9	13·1	65·0	2	32·0	29	33	11	3	2	15	49·6	46·9	5·4	83	3·6	0·9	544·6	2·29	18
Nov.	30·142	30·543	19	29·713	7	·270	46·8	52·0	40·2	46·0	11·8	61·0	1	28·0	25	33	8	7	5	10	44·7	42·3	4·5	85	3·1	0·6	551·0	2·58	19
Dec.	29·920	30·273	22	29·383	20	·244	45·1	49·0	39·1	44·0	9·9	56·0	7	29·0	22	27	9	5	5	12	42·6	39·7	5·4	81	3·8	0·6	549·1	3·97	20
Means	29·998	30·392		29·405		·316	51·9	59·4	45·2	52·0	14·3	67·4		33·3		33·8	76	62	93	135	48·9	45·9	6·0	81	3·6	0·9	542·8	32·63	15

REMARKS.—The Barometer is a Standard by Barrow, and has been compared by Mr. Glaisher with the Standard at Greenwich. The Cistern is 45 feet above mean sea level. All the Barometic readings have been corrected for Index Error and Capillarity, and reduced to 32 degrees Fahr. at sea level. The Thermometers and Rain Gauge are placed on the roof of the Royal Institution at Truro, about 40 feet above the ground, the former being in a wooden shed through which the air passes freely. The Standard dry and wet bulbs are by Negretti and Zambra, and have been corrected by Mr. Glaisher. Corrections for Diurnal Range have been applied where necessary.

TABLE No. 6.—HELSTON. *Lat. 50° 6′ N., Long. 5° 15′ W., for the year 1884.*

From Registers kept by Mr. John Gill.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.													WIND.				HYGROMETRIC CONDITION.					RAIN.		
1884.	Mean pressure of atmosphere.	Maximum pressure observed.	Date.	Minimum pressure observed	Date.	Readings at 9 a.m dry	Readings at 9 a.m wet	Readings at 9 p.m. dry	Readings at 9 p.m. wet	Corrected mean of Dry Bulb.	Mean of daily Maxi ma.	Mean of daily minima.	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	Mean temperature of Evaporation.	Mean temperature of the dew point.	Mean humidity, complete saturation-100	Mean weight of vapour in a cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	No. of rainy days.	Mean degree of cloudiness—9 a.m.
	In.	In.		In.		o	o	o	o	o	o	o	o	o		o		o					o	o		Grs.	Grs.			
Jan.	30·311	30·663	15	29·148	6	47·1	46·0	46·8	45·7	47·0	50·6	44·1	6·5	56·2	24	35·3	1	20·9	3	2	11	15	45·8	44·5	92	3·36	553·9	1·800	16	8·5
Feb.																												4·293		
March	29·855	30·198	21	28·500	29	46·5	44·3	45·3	43·7	46·0	50·9	41·7	9·2	53·4	16	32·5	11	25·9	4	6	11	10	44·0	41·7	86	3·10	546·6	3·805	23	6·4
April	29·782	30·230	13	29·010	4	48·1	44·9	44·0	42·5	46·0	52·0	41·6	10·4	58·9	4	33·8	19	25·1	7	12	9	2	43·7	41·1	84	3·01	545·4	2·050	9	5·6
May	30·308	30·160	20	29·550	4	53·8	51·0	47·7	46·7	50·7	58·4	45·9	12·5	68·8	24	36·2	21	32·6	7	8	6	10	48·8	46·8	88	3·67	549·6	1·120	12	4·8
June	30·1·1	30·570	14	29·600	2	59·0	56·7	52·8	52·1	55·9	64·5	49·2	15·3	73·2	21	43.3	10	29·9	15	3	3	9	54·4	53·0	91	4·57	539·7	1·370	15	5·5
July	29·956	30·300	25	29·600	10	63·2	59·6	57·9	56·2	60·0	67·1	54·5	12·6	75·9	31	44·0	26	31·9	3	2	13	13	58·0	56·2	88	5·10	532·6	3·570	25	6·9
Aug.	29·879	30·295	4	29·720	31	64·7	61·2	58·2	54·7	62·5	70·1	55·6	14·5	76·9	11	50·2	15	26·7	10	6	7	8	58·0	54·2	75	4·65	528·8	0·150	9	4·2
Sep.	29·959	30·375	18	29·532	6	63·5	60·4	57·3	54·2	60·2	65·6	55·3	10·3	74·7	18	43·8	29	30·9	6	10	7	7	57·3	54·7	83	4·80	532·4	2·390	6	5·2
Oct.	30·106	30·580	5	29·272	9	52·0	50·9	51·8	47·4	51·0	58·0	50·0	8·0	62·8	6	40·8	11	22·0	13	5	8	5	48·6	46·1	84	3·52	545·6	1·920	19	7·9
Nov.	30·203	30·560	19	29·790	7	47·7	45·7	45·9	43·7	46·8	51·4	43·9	7·5	59·1	3	34·5	22	24·6	12	8	5	5	44·6	42·1	84	3·06	552·2	0·400	19	6·6
Dec.	30·005	30·220	22	29·710	11	47·7	45·4	49·3	47·7	48·5	53·8	43·2	10·6	62·6	7	33·5	22	29·1	10	1	4	16	46·5	44·3	86	3·30	546·5	1·690	11	6·1
Means.	30·041	30·377		29·403		53·8	51·5	51·6	48.6	52·2	58·4	47·7	10·7	66·1		38·9		27·2	90	63	84	100	50·9	47·7	86	3·83	543·0	24·530	164	6·1

The Thermometers are by Casella. They are placed in a Stephenson Screen facing North, and have been verified at Kew Observatory. The Rain Gauge (also by Casella), has a diameter of 8 inches. The Instruments at this Station are the property of the Royal Cornwall Polytechnic Society—with the exception of Max. and Min. Thermometers, which belong to Mr. Gill.

TABLE No. 7.—SCILLY ISLANDS. Lat. 49° 55′ N.; Long 6° 19′ W.

From Observations taken by Mr. William Thomas.

DATE	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND				HYGROMETRIC CONDITION.								
1884	Mean pressure of the atmosphere.	Maximum pressure observed.	Date of Max.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of vapour.	Mean of Dry bulb.	Mean of daily maxima.	Mean of daily minima.	Mean temperature.	Mean daily range.	Absolute Max.	Date of Max.	Absolute Min.	Date of Min.	Monthly range.	Relative proportion of N	E	S	W	Mean temp. of evaporation.	Mean temperature of dew point.	Mean diff. between dew point and air.	Mean humidity, complete satrtn.=100.	Mean weight of vapour in cubic foot of air.	Meanadditional weight of vapour required to saturateCubic ft of air	Mean weight of a Cubic foot of air.	RAIN.	No. of rainy days.
	in.	in.		in.		in.	°	°	°	°	°	°		°		°					°	°	°		grs.	grs.	grs.	in.	
Jan.	30·137	30·620	15	29·300	26	·307	48·9	50.6	46·0	48·3	4·6	54·0	10	39·0	2	15·0	6	3	9	13	47·4	45·7	3·2	90	3·41	0·45	548·5	3·01	20
Feb.	29·794	30·540	3	29·220	1	·286	47·0	50·0	43·3	46·6	6·7	54·0	10	34·0	3	20·0	2	5	12	10	45·5	43·8	3·2	89	3·30	0·40	544·4	3·50	20
March	29 865	30·230	6	29·280	10	·274	47·1	51·0	43·4	47·2	7·6	57·0	18	37·0	11	20·0	5	7	11	8	45·0	42·7	4·4	85	3·18	0·53	545·6	2·34	23
April	29·764	30·100	14	29.120	5	·281	48·2	51·7	43·6	47·6	8·1	57·0	7	38·0	18	19·0	8	11	7	4	45·9	43·4	[illegible]·8	84	3·25	0·59	542·7	2·52	15
May	29·995	30·370	21	29·570	4	·335	53·2	56·6	48·5	52·5	8·1	62·0	23	45·0	Thr	17·0	6	6	8	11	50·6	48·0	5·2	83	3·76	0·78	541·1	1·34	10
June	30·088	30·350	15	29·550	2	·388	57·3	60·7	52·4	56·5	8·3	68·0	26 Thr	46·0	7	22·0	12	4	4	10	54·5	52·0	5·3	83	4·32	0·94	538·1	0·73	14
July	29·932	30·230	30	29·560	10	·446	61·0	64·7	56·1	60·4	8·6	69·0	Thr	53·0	oft	16·0	4	3	12	12	58·2	55·8	5·2	83	4·96	1·04	531·0	4·78	24
Aug.	30·007	30·250	26	29·730	28	·464	62·8	66·9	57·7	62·3	9·2	72·0	8	53·0	29	19·0	6	5	10	10	59·6	56·9	5·9	82	5·12	1·24	530·5	1·43	12
Sep.	29·994	30·320	18	29·550	6	·439	59·9	64·3	55·1	59·7	9·2	71·0	19	50·0	16	21·0	6	7	8	9	57·5	55·4	4·5	86	4·87	0·91	533·3	2·40	18
Oct.	30·139	30·629	5	29·770	24	·343	54·1	56·9	50·5	53·7	6·4	63·0	1 3	41·0	11	22·0	11	4	4	12	51·3	48·6	5·5	81	3·88	0.84	512·7	1·10	18
Nov.	30·155	30.520	10	29·690	7	·292	50·1	52·4	46·6	49·5	5·8	59·0	2 6	42·0	4·25	17·0	9	6	7	8	47·3	44·3	5·8	81	3·85	0·76	547·6	2·30	21
Dec.	29·906	30·260	22	29·310	3	·298	48·0	50·2	43·6	46·9	6·6	56·0	14	35·0	27 28	21 0	8	5	8	10	46·1	44·0	4·0	87	3·32	0·48	545·4	2·77	22
Means	29·981	30.367		29·477		·345	53·1	56·3	48·9	52·6	7·4	61·8		42·7		19·1	83	66	100	117	50·7	48·4	4·7	84	3·90	0.75	540·9	28·22	217

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EXPLANATION OF DIAGRAM.

(*On Opposite Page.*)

The curves shown in the accompanying diagram are based on observations taken at the Meteorological Observatory at Falmouth, with instruments belonging to the Meteorological Council.

It will be observed that the Diagram is divided vertically into months, weeks and days; the months being separated by thick lines, the weeks by thinner lines, and the days by the finest lines. Opposite every Sunday the day of the month is inserted at the upper part of the Diagram. Thus the day of the month and the day of the week may be readily ascertained.

In the upper part of the Diagram the Velocity of the Wind is shown; the spaces between the finest horizontal lines representing two miles per hour. The velocity indicated by the curve is the average of the whole of the 24 hours from midnight to midnight; and this velocity is shown by the height of the curve midway between the fine lines dividing the days.

Below the curve of velocity the prevailing Direction of the Wind during the day from midnight to midnight is inserted.

In the lower part of the Diagram is a curve of Barometical Pressure drawn on a natural scale, and representing the average height of the Barometer for the 24 hours composing every day; the height of the curve midway between the fine lines dividing the days indicating the average pressure. In all cases the Barometic Readings have been reduced to 32° at mean sea level.

Below this curve, the mean temperature of the day is given in degrees Fahrenheit.

DIAGRAM SHOWING THE

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1884.

CATALOGUE

OF THE

FIFTY-SECOND

Annual Exhibition

OF THE

ROYAL CORNWALL POLYTECHNIC SOCIETY,

AT THE

POLYTECHNIC AND DRILL HALLS, FALMOUTH,

FROM

August 12th to August 16th.

FALMOUTH:
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1884.

FIFTY-SECOND ANNUAL
EXHIBITION
OF THE ROYAL CORNWALL
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AUGUST 12 TO 16, 1884.

PROGRAMME FOR THE WEEK.

TUESDAY, AUGUST 12th.

MORNING.—Exhibition opens to Members at Eleven o'clock; to the Public at Noon. Opening Address by the President, the Right Hon. the EARL OF MOUNT EDGCUMBE, in the Polytechnic Hall, at One p.m.

At 4 o'clock the Earl of MOUNT EDGCUMBE will Lay the Foundation Stone of the New Observatory, at the Site near Belmont.

EVENING.—Doors open at 6 p.m. At 8 p.m., Lecture "On the alterations which have been made in the Laocoon Group and other antique Statues," Rev. Wm. Iago, B.A.

ADMISSION, (including both Halls,) Morning, 2s. 6d.; Evening, 1s.

WEDNESDAY, AUGUST 13th.

MORNING.—Doors open at 10 o'clock. At 2 p.m., Annual Meeting of the Miners' Association of Cornwall and Devon, in Committee Room opposite entrance to Gallery of Polytechnic Hall.

About 3.30 p.m., Competitive Trial of Rock Drills, driven by Compressed Air, at Drill Hall.

EVENING.—Doors open at 6 o'clock. At 8 p.m., Lecture in the Photograph Room, (Polytechnic) subject:—"Popular Weather Proverbs," W. Marriott, Esq., Assistant Secretary to the Royal Meteorological Society.

Cheap Excursion Trains from Plymouth and Penzance on this day.

ADMISSION, Morning, 1s.; Evening, 1s.

THURSDAY, AUGUST 14th.

MORNING.—Doors open at 10 o'clock. At 2.30 p.m., an Address explanatory of the Cambridge University Local Lectures Scheme, R. D. Roberts, Esq, M.A.

ADMISSION, 1s.

EVENING.—Doors open at 6 o'clock. At 8 p.m. an attractive Vocal & Instrumental **CONCERT** in Polytechnic Hall, T. J. Thuell, Esq., Hon. Conductor.

ADMISSION to Exhibition and Concert, 2s.

FRIDAY, AUGUST 15th.

MORNING.—Doors open at 10 o'clock. **ADMISSION, ONE SHILLING.**

EVENING.—Doors open at 6 o'clock. At 9 p.m., the Annual Drawing for Prizes in the Art Union of Cornwall. **ADMISSION, ONE SHILLING.**

SATURDAY, AUGUST 16th.

MORNING.—Doors open at 10 o'clock. ***ADMISSION, SIXPENCE.***

EVENING.—Doors open at 6 o'clock. **Vocal & Instrumental Music at Intervals.** ***ADMISSION, ONE SHILLING.***

EDWARD KITTO, F.R.Met.Soc., Secretary.

For the Purchase of Pictures, &c., apply to Mr. E. KITTO, Secretary of the Society.

☞ Office at End of Gallery.

CATALOGUE.

MECHANICS.

Sections I., II., III.

1	Models of Engines	W. H. Andrewartha	*Prize 10s.*
2	Drawings of ditto	ditto	
3	Drawing of 80-in. Cornish Pumping Engine ...	Thomas Paull	
4	Model Automatic Bench Stop ...	Thomas Rooke	*Commended*
5	Patent Self Igniting and Inextinguishable Danger Flare-up	Joseph R. Holmes	*First Bronze Medal*
6	Patent ditto Rescue Signal Lights ...	ditto	
7	Ditto ditto Distress Signal	ditto	
8	Government Standard Wire Gauges, folding, round, and rectangular	Jules Sabatier	
9	Patent Welding Cloth for Iron or Steel	ditto	*Highly Commended*
10	Models of Smiths' Tools	James Williams	*Prize 10s.*
11	Small Steam Engine	J. H. Jones	*Prize 15s.*

12 Model of Beam Engine and Copper Boiler fitted complete
William Francis
Prize £1

13 Tyson's Hand Machine for facing flanges of steam pipes and other purposes ... ... John Tyson

14 Specimen of work done by ditto, in three minutes ditto

15 Patent Putty Scraper ... ... T. Le Poidevin
Commended

16 Standard patent Macramé Lace Loom
Anyon's Patent Macramé Lace Loom Co.

17 Two double frame ditto ... ... ditto

18 Tension frame .. .. ditto
Second Bronze Medal

19 Model of New Oscillating Motion ... James Warwick

20 Ditto ditto ... ... ditto
Second Silver Medal

21 Case of Hand Tools of cast steel ... David Low
First Bronze Medal

22 Model Wheelbarrow of Pinus Insignis, grown at Penrose, made by exhibitor, aged 79 ... Wm. Webb

23 Drawing of Machine for Raising Water above or to its level, and thereby producing motion ... Robert R. Beard

24 Drawing of Cornish Boilers, having in view the lessening of the effects of the corrosive action of impure water in Cornish boilers ... ... John Glanville

25 Improved Water Churn ... ... George Thomas
Second Bronze Medal

26 Eureka semi-spherical pointed Pens ... D. Leonardt & Co.
Second Bronze Medal

27 New Patent Reservoir Penholder ... ditto

28 Water Meter ... ... Chas. Asbury

29 Specimens of Wood Carving, chain-circlet ... John G. Kelway

30 Ditto chain and ball ... ditto

31 Model House and Garden ... ... J. C. Trudgen

32 The Chelsea patent Reversible Centre Bit Mortice Lock
A. W. Pocock

33 Model of Thompson's patent Pulverizer
The Globe Mill Co., Limited

34 Three Diagrams of ditto ... ... ditto

35 The Domestic Motor, Davey's patent, a small steam engine which works without any pressure in boiler
Hathorn, Davey, & Co.
Second Silver Medal

36 Large Model of the open-cast of the South Lode, Rio Tinto Mine, executed by Mr. C. N. Thwaite, London
Rio Tinto Mining Company
Second Silver Medal to Maker

37 Tucker's Improved Weather Tight Window
James D. Tucker

38 "Visible Drop" Automatic Lubricator, Schonheyder's patent ... ... Beck & Co.
First Bronze Medal

39 Table Top, made from New Zealand woods, by Mr. W. H. Jewell, of Christchurch, N. Z., formerly of Truro
Contributed by Mrs. Enys
Second Bronze Medal to Maker

40 Model of Safety Appliance for Cages in Cornish Mines
W. Teague, Jun.

41 Patent Victoria Steam Kettle without bottom or lid
City of London Sanitary Association

42 Patent Automatic Disinfector apparatus ... ditto

43 Patent Fluid ... ... ditto
Recommended for trial

44 Patent Improved Rowlock ... E. Robertson
First Bronze Medal

45 Cross Section of Peevor District ... W. T. White
£2, Special Premium

46 Transit Instrument ... ... A. J. Frost

47 Model of Shackle for use in Mines ... Wm. Rosewarne

48 Model of Cornish Whim ... ... James Pryor

49 Drawing of Capstan ... ... W. Sisson

EXHIBITED IN

DRILL HALL.

MECHANICS, GAS APPARATUS, Etc.

57 Working Model of Machine used in drawing and charging Gas retorts ... . John Somerville
First Bronze Medal

58 Regenerating Furnaces for ground floor retort houses ditto
Highly Commended

59 Full size Patent Dip Reducer ... ... ditto
First Bronze Medal

60 Three-light Dry Meter ... ... W. & B. Cowan

61 Three-light, (Warner and Cowan's Patent) Wet Meter ditto

62 Three-light Patent Measuring Drum ... ... ditto
First Bronze Medal

63 Model of Cowan's Patent Gas Governor ... ditto
Second Silver Medal
64 Ditto Testing Meter ... ... ditto
65 Meter Index ... ... ditto
66 Sugg's "Taj" Lamp, suspended in Hall ... W. Sugg & Co.
First Silver Medal
67 ditto Patent Lambeth Flat-flame Shadowless Lamp ditto
68 ditto Victoria ditto ditto
69 ditto Governor Burners for Kitchens ... ditto
70 Joslin's patent Indicator for showing consumption of gas per hour, without the aid of a meter ... ... ditto
71 Model of Thomas and Ennor's patent Hydraulic Valves
James Thomas
72 ditto Hydraulic Bye-pass valve ... ... ditto
73 ditto Patent Antidip, with moveable ascension pipe ditto
Second Bronze Medal
74 Drawings in connection with ditto ... ... ditto
75 "Eureka" Gas Cooking Stoves ... John Wright & Co.
76 ditto ditto (enamelled) ditto
First Bronze Medal for Improvements
77 "Kyrle" Heating Stoves ... ... ditto
First Bronze Medal
78 Gas Bath ... ... ditto
79 Instantaneous Spiral Water Heater ... ditto
Second Silver Medal
80 Phœnix Heating Stoves, (in competition) ... ditto
First Bronze Medal
81 Gas Stove for heating Tailors' Irons .... ditto
82 Duplex Gas Stove ... ... ditto
83 Gas Boiling Stoves ... ... ditto
84 Gas Cooking Stove, (unlined) ... Arden, Hill & Co.
85 ditto lined with white tiles ditto
86 Two ditto packed with non-conductor ditto
87 "Lively" Asbestos Fires ... ... ditto
88 "Superb" ditto ... ... ditto
89 Gas Heating Stoves, (various) ... ... ditto
90 Gas Accessories—Gas Bath, (in competition) ditto
First Bronze Medal
91 Patent Steamer Washer ... ... ditto
First Bronze Medal
92 Gas Cooking Stove, lined with non-conducting material
A. J. West & Co.
93 Gas Fire, in patent metal case ... ditto
94 Ditto, in ornamental cast iron case ... ditto

95 Stand of Gaseliers, Hall Lamps, Bronzes, Brackets, and Steam fittings ... ... Willey & Co.
First Bronze Medal for Stand of Gaseliers

96 Gas Meters ... ... ditto

97 Gas Heating Stove ... . ditto

98 "Cosy" Gas Fire ... ... ditto

100 Slide Valve Steam Pump ... ... Ashmore & While
Second Silver Medal

101 The "Barrow" Rock Drill, mounted, Barrow Rock Drill & Engineering Company

102 The "Cornish" Patent Rock Drill, 3½" cylinder, Holman Bros.

103 Ditto ditto ditto ditto

104 Stephens's Patent Improved Reversible Tappet Rock Drill, R. Stephens and Son
First Silver Medal

105 Stephens's Improved Air Valve Rock Drill ditto

106 Teague's Patent Rock Drill ... ... W. Teague, jun.

107 Ditto ditto ditto ditto

108 Improved Ventilating Fan, ditto

109 Patent "Eclipse" Rock Drill, fitted with patent automatic feed, 1⅞in. diameter piston, for plug and feather work .. .. Hathorn & Co.

110 Ditto 2½in. Piston, fitted with hand feed ... ditto

111 Ditto 3in. Piston ... ditto ... ... ditto

112 Ditto 3½in. do. ... ditto ... ... ditto

113 Patent Hydraulic Column ... ... ditto
First Bronze Medal for Cone Joint

114 Improved Screw Column and clamp ... ditto

115 Improved patent Donkey Pump, for feeding boilers, or draining purposes ... ... ditto
Second Silver Medal

116 Patent Reliance Air Compressor, fitted with patent guide for valve spindles ... ... ditto

117 The "Rainbow" patent steam Water and Liquid Raiser C. H. Rosher
First Bronze Medal

118 Small Steam Capstan for yachts or trawlers W. Sisson
Second Silver Medal

119 The Domestic Motor (Davey's patent) Hathorn, Davey & Co.
Second Silver Medal

120 Patent carriage Umbrella Holder .. Charles Butlin
Commended

121 No. 6 Wheel Feed Machine for Leather Work
Wheeler & Wilson Manufacturing Co.
122 No. 7 Button Hole Machine ... ... ditto
123 No. 8, for domestic use ... ... ditto
124 „ hand machines ... ... ditto
125 No. 10, Tailoring Machine with new Seam Trimmer ditto
126 Samples of China Clay as dug and prepared for market ... ... Martin Bros.
127 Fire Bricks ditto ditto ditto
128 Samples of Lime Coke resulting from the use of Cooper's Coal liming process.

Essays, Scientific Papers, Chemistry, and Electricity.

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190 Illustrations of Descriptive Geometry ... George Cussons
191 Ancient British Quern, ploughed up in a field at Force House, between Cockermouth and Isel, 1867
192 Capstan, Drawing of ... ... W. Sisson
193 Model Toy ... ... A. K. Barnett
194 Ditto Balance Engine ... ... ditto
195 Ditto Pump ... ... ditto
196 Ditto Vertical Saw ... ... ditto
197 Ditto Electric Fountain ... ... ditto
198 Three Electric Motors ... ... ditto
199 Case containing three sets of 60 cut glass models of Crystals; one set of 80 Imitation Precious Stones; two sets of 15 famous Diamond Models; one set of 4 ditto. Scale of Hardness after Mohr and Breithart
Dr. Theodor Schuchardt
First Bronze Medal
200 Collection of Artificial Crystals chiefly found in smelting operations ... Wm. Terrill
201 Essay–Description of the Florida Main Lode, Cardiganshire
Edward Halse, Associate Royal School of Mines
Special Premium, £5

NAVAL ARCHITECTURE.

206 Design and Model of Steamship, with plan of ditto, scale ⅛ in. to foot ... ... Thos. H. Ivey *Prize, 15s.*

207 Model of Barque, 200 tons register ... ditto

208 Model of Steam Tug "Eagle," built by Harvey & Co., Hayle, for J. H. Deeble & Sons. Length 100 ft., breadth 17 ft., depth 10 ft., gross tonnage, 103, registered 17 tons.

FINE ARTS.

Section 1a.—Professional Artists' Oil Paintings.

212	Hastings—The Priory ...	South Kensington Museum			
213	The Fish Market ...	Sir D. Wilkie—lent by Mr. F. C. Lane			
214	Another Bite	South Kensington Museum			
215	River Scene	ditto ditto			
216	The Antiquary's Cell	ditto ditto			
217	The Old Mill, near Dolgelly,	W. Muller, lent by Mr. F. C. Lane			
218	Portrait of Her Majesty in her Coronation Robes	South Kensington Museum			
219	Sheep and a Coming Storm, (water color) ...	David Cox, lent by Mr. F. C. Lane			
220	The Pool	South Kensington Museum			
221	The Stray Kitten	ditto ditto			
222	Mending the Bait Net	ditto ditto			
223	Landscape—Evening	ditto ditto			
224	Cottage, Interior	ditto ditto			
231	Repairing a Net	Richard Quance	3	3	0
232	Norsling Nets	ditto	3	3	0
233	Mending a Net	ditto	3	3	0
234	The Old Mill	Henry R. Babb	5	5	0
235	Murky Weather, Kynance ...	C. V. Popham	2	2	0
236	Whitsand Bay, Land's End ...	J. Richardson	1	5	0
237	Hawthorn	Isabella M. Bannister	2	2	0
238	In Sight	Henry R. Babb	4	4	0
239	Trebarwith	Henry Preston	2	15	0

240	Gorge of the East Lyn	C. V. Popham	1	10	0
241	On the Fowey	Helen T. Grylls	2	10	0
242	"Isn't that Dreadful"	Francis Lane	5	5	0
243	Roses	Sarah E. Bluett	2	10	0
244	The Dead Bird	Louisa Elton	7	7	0
245	Geraniums	Helen T. Grylls	4	4	0
246	Dartmouth Castle	W. J. Love		15	0
247	On the Warren	Henry Brice	5	0	0
248	Resting	Mary I. Grant	7	7	0
249	Tavy Cleave	Rev. J. Jane	4	4	0
250	Grey Morning, St. Michael's Mount	J. C. Uren	3	3	0
251	In Gidleigh Park	W. Williams	5	0	0
252	A Scene at Mothecombe, S. Devon	Thos. Dingle, jun.	5	10	0
253	Chrysanthemums	H. Lilian Haslope	5	5	0
254	On the Lyd, Dartmoor	W. Williams	8	0	0
255	By Parcels Post	H. Lilian Haslope	5	5	0
256	On the Marshes, near Topsham	Henry Brice	5	0	0
257	Perran Creek, under Carclew	G. Hart Taylor	4	4	0
258	Grapes, Melon, and Pear	Annie Martin	4	10	0
259	Among the Breakers—Boats running for Harbour	Lavin Pascoe	6	6	0
260	Morning	F. Lane	6	6	0
261	Trawlers, Gwavas Lake	Lavin Pascoe	2	2	0
262	Newlyn Fishing Village	J. C. Uren	2	2	0
263	Primroses	Isabella M. Bannister	4	4	0
264	St. Michael's Mount (to be sold in aid of St. Mawes Church Fund	Rev. C. W. Carlyon	10	0	0
265	A Midsummer's day, Mount's Bay	Lavin Pascoe	6	6	0
266	Sunset on the Moor	J. Richardson	1	10	0
267	Fingle Bridge	F. Foot	5	5	0
268	Port Wrinkle	Henry R. Babb	12	12	0
269	Brook, near Woodbury, Devon	S. G. W. Roscoe	10	0	0
270	Fruit	H. Lilian Haslope	8	8	0
271	On the Dart, near Newbridge	W. Williams	50	0	0
272	On the Erme, Devon	F. Foot	8	8	0
273	Mending Nets	R. H. Carter			
274	"Her heart went with her laddie's boat"	ditto			
275	His Evening Pipe	ditto			
276	Morning at Beer, Devon	Gustave de Breanski	15	15	0
277	The Lledr Valley, Bettws-y-coed	ditto	35	0	0
278	The Last of the Season	H. Lilian Haslope	10	10	0
279	Snowdon, from Pen-y-Gwryd, in Wales,	Alfred de Breanski	18	18	0
280	The Lion Rock, Lizard	W. Gibbons	22	10	0
281	A Scene on the South Coast of Devon,	T. Dingle, jr.	5	0	0

282	Stiff Breeze, Beer Head	Gustave de Breanski	12	12	0
283	Entrance to Trefusis	George Carter	4	0	0
284	Castle of Chillon	W. J. Love	4	0	0
285	Horse Chestnut Blossom	S. E. Bluett	3	10	0
286	Bumble Rock	J. Richardson	1	5	0
287	Rosenythorne Cottage, Porthoustock,	ditto	1	1	0
288	General view of Polperro	J. B. Babb	4	4	0
289	Portrait of a Turk	Millie Corin	1	10	0
290	"Portrait of my father at 72 years,"	ditto			
291	Heartsease	Annie Martin	3	3	0
292	The Young Matelotte	Fanny Trentham	5	5	0
293	Mount Edgcumbe Park—the road leading to Cawsand	J. B. Babb	3	3	0
294	Hennacliff	Rev. J. Jane	4	4	0
295	Fruit	M. A. G. Evans	3	3	0
296	Bude Haven	S. Neville	4	4	0
297	St. Michael's Mount	W. J. Love	1	10	0
298	A Flemish Calvary, contributed by C. Napier Hemy				
299	Portion of a Series of Cornish Drawings made for the English Illustrated Magazine, contributed by C. Napier Hemy				

Section 2b.—Contributed by Professional Artists. Water Colour Drawings.

300	"Homeward from the Moor returning, Hesperus the guiding star"	W. Colebrooke Stockdale	5	5	0
301	A Cornish Orchard	Geo. Carter	4	0	0
302	Polperro, looking out	J. B. Babb	3	3	0
303	Swanpool	Geo. Croker Fox	4	4	0
304	Twilight on the Exe	Susan Selley	3	3	0
305	Kynance Cove	J. O. Nash	5	5	0
306	Dixcart Bay, Sark	ditto	8	8	0
307	"T'was in Autumn by the Mill Leat, the old, old story"	W. Colebrooke Stockdale	5	5	0
308	St. James's Park, London	Susan Selley	4	4	0
309	The Grand Autelet, Sark	J. O. Nash	10	10	0
310	Scene near Lydford	Thos. Dingle, jun	6	0	0
311	Moonlight on the Lynher, St. Germans	J. B. Babb	3	3	0
312	Scene near Newton Ferrers	Thos. Dingle, jun.	6	0	0

313	A Devonshire Lane	C. V. Popham	3	3	0
314	Margin of the Western Ocean	W. Casley	12	0	0
315	Notter Bridge Mill	F. Browning	5	5	0
316	Mullion, from Hunchcliff Head	J. O. Nash	5	5	0
317	Stormy Weather at Kynance	W. J. Love	1	1	0
318	River Plym	F. Browning	5	5	0
319	Cottage near Topsham	Susan Selley	3	3	0
320	Near Exminster	ditto	3	3	0
321	Gloucester Cathedral	ditto	4	4	0
322	A Yorkshire Fishing Village	G. C. Fox	4	4	0
323	Newton on the Yealm	Frank Browning	10	10	0
324	"When the West with Evening Glows"	T. Dingle, jun.	10	0	0
325	Sea at Swanpool	W. Boase Smith	10	10	0
326	Minehead	J. G. Philp	35	0	0
327	Lion Rock, Kynance	H. Preston	7	7	0
328	A Timber Barge, Topsham	S. G. W. Roscoe	12	12	0
329	Morning, Newlyn	H. Preston	5	0	0
330	Tree Ferns, Lamorran	G. H. Taylor	7	7	0
331	Petit Tor, near Torquay	J. G. Philp	20	0	0
332	Looking down on Kynance Cove	Nora Taylor	4	4	0
333	Carting Seaweed	J. G. Philp	26	5	0
334	A Wreck	C. Topham Davidson	52	10	0
335	Sketch on the Beach, Falmouth	R. H. Carter			
336	Lizard Head in a Fog	G. Hart Taylor	5	5	0
337	On the Exe at Countess Weir	S. G. W. Roscoe	12	12	0
338	Rhododendrons, Lamorran	G. H. Taylor	6	6	0
339	Kynance Valley	ditto	5	5	0
340	At the Harbour Mouth, Penzance	J. C. Uren	6	6	0
341	Mullion	G. Hart Taylor	5	5	0
342	A Dartmoor Road	Henry R. Babb	7	7	0
343	Evening by the Sea	ditto	6	6	0
344	Apple Blossoms	M. A. G. Evans	3	3	0
345	Winter	W. Casley	5	0	0
346	Raspberries	Ellen Genn	5	5	0
347	Kynance Cove	G. H. Taylor	5	5	0
348	An old foot bridge, Dartmoor	Henry R. Babb	7	7	0
349	Evening near Nice	Mary I. Grant	6	6	0
350	Chrysanthemums	Ellen Genn	4	4	0
351	Pansies	ditto	2	12	6
352	Devoniensis Roses	ditto	2	12	6
353	Mimulus Glutinosus	Gertrude A. Taylor	2	2	0
354	Rome from the Palace of the Cæsars	Louisa Fennell	5	5	0
355	Wallflowers	Ellen Genn	3	3	0

356	On Penolver Point, Lizard	Nora Taylor	3	3	0
357	White Œnothera	ditto	2	2	0
358	Llangollen, N. Wales	Mary I. Grant	9	9	0
359	Gum Cistus	Nora Taylor	2	2	0
360	The Rill Head, Lizard	ditto	3	3	0
361	Beech Trees near Hillersden	Mary I. Grant	5	5	0
362	Group of Flowers	Clara J. Worsdell	4	4	0
363	Spring Morning on the Fal	G. H. Taylor	2	2	0
364	Haymaking	Mary I. Grant	8	8	0
365	Morning on the Palatine	Louisa Fennell	5	5	0
366	Reflections—Devoran	G. H. Taylor	2	2	0
367	Falmouth Harbour—Morning	W. Boase Smith	5	0	0
368	Twilight, Swanpool	ditto	9	9	0
369	Enjoying the Sunshine	ditto	5	0	0
370	Falmouth Bay from Pennance	S. Tresidder	3	13	6
371	At Penberth Cove	J. C. Uren	7	7	0
372	Now	F. Browning	5	5	0
373	Asparagus Island	H. Preston	4	0	0
374	Kynance	S. Tresidder	3	3	0
375	Maenporth	ditto	2	12	6
376	Waiting for the Boats	J. C. Uren	4	4	0
377	Sketch from Dawlish beach	W. J. Love	1	1	0
378	Cliffs at Perranporth	Martha J. Pill	4	4	0
379	Durham Cathedral	H. C. Ricketts	3	3	0
380	Bumble Rock	S. Tresidder	2	12	6
381	Sunlight and Shadow	ditto	2	2	0
382	Dorothy Vernon's Steps	C. V. Popham	2	2	0
383	Yellow Roses	Ellen Genn	2	2	0
384	Cornish Farm Yard	M. J. Pill	2	2	0
385	"The Day is dying in the West"	W. Casley	3	0	0
386	Escape Rock, Perranporth	Martha J. Pill	1	1	0
387	Coast View, Perranporth	ditto	1	1	0
388	Gunwalloe Church Cove	W. Casley	3	0	0
389	Basket of Flowers	J. B. Babb	3	3	0
390	Hastings, after Cook	M. A. G. Evans	1	10	0
391	Chrysanthemums	ditto	3	3	0
392	Heath, from nature	ditto	7	7	0
393	Shore, Perranporth	Martha J. Pill	1	1	0
394	May Blossoms	M. A. G. Evans	1	10	0
395	Prebends Bridge	H. C. Ricketts	2	2	0
396	Frame of Miniatures	R. Faulkner	31	10	0

£10 10 0 each

Section 2a.—Oil Paintings by Amateurs.

405	Mistress Madge	Annette S. Morphew *Highly Commended*
406	Fishing Boats, Falmouth Harbour	F. Massey
407	On the Thames	Arthur Rickard
408	A Summer's Day	Wm. Oke
409	On the Sands	ditto
410	A Dangerous Coast	Lt.-Col Carlyon
411	Portrait of Mrs. Melvill	Constance Hill
412	Collie Dog	Henrietta Chichester
413	Study, from life	Lt.-Col. Carlyon
414	Still life	Margaret Wales *Second Silver Medal*
415	Study, from life	Lt.-Col. Carlyon
416	Jesmond Dene	Lydia E. Worth *First Bronze Medal*
417	Sunset—after Van Hier	Lt.-Col. Carlyon
418	Old Roman Bath, at Bath	Annette Morphew *Second Silver Medal*
419	Moonlight	Lt.-Col. Carlyon
420	Study of Trees	James C. Richards
421	Ditto	ditto
422	Study of a Head	F. Massey
423	Pentillie Quay	Helen C. Kempthorne
424	Red Poppies	Jessie Middleton
425	Yellow Marguerites	Ida C. Wickett

Section 2b.—Water Colour Drawings by Amateurs.

436	Twelve Drawings of Birds	J. Gatcombe *First Silver Medal*
437	Grasmere Lake	F. E. Fox
438	Frying pan, Cadgwith	Annie M. Lean
439	Ross, from Benhall	Louisa H. Harris *Second Silver Medal*
440	King of the Olives	S. Kerswill
441	Near Llanfairfechan	ditto

442	Poppies	Rachel J. Fox
443	Cacti	ditto
		First Bronze Medal
444	Plantation Pathway, Uplands	F. E. Fox
445	Nasturtiums	Lottie Guppy
		Second Bronze Medal
446	The River, from Pont-y-pair	Theresa Hoblyn
447	Old Roman Hedge over the Conway	ditto
448	Park Hill, Bettws-y-Coed	ditto
449	Abbey Bridge, North Wales	ditto
450	Kynance Cove	Eunice Rowe
451	Blue and Gold	C. J. Mitchell
		First Silver Medal
452	Meadfoot, Torquay	Eleanor Edmonds
453	Sweet Peas	Jessica Middleton
454	Blarney Castle	Eunice Rowe
455	Sketch, Saltram	J. C. Richards
456	Kynance	Joseph Blamey
457	Lucerne	ditto
458	Christmas Rose	Lottie Guppy
459	Roundham Head	Eleanor Edmonds
460	Sunshine and Shadow	C. J. Mitchell
461	Denham Bridge	J. C. Richards
462	Saltram	ditto
463	Wreck, near Penzance	H. N. Lincoln
464	Twilight Spirits—the Storm Council	C. J. Mitchell
465	Drawing of Flowers	Katie Robinson
466	Ditto	ditto
		Prize 7s. 6d.

Section 3a.—Pen, Ink and Crayon, &c.

501 Portrait (crayon) of Sir Stafford Northcote
Maud Coleridge 5 0 0

Amateur.—Pen, Ink and Crayon.

515	A Dip in the Sea	Wm. Chas. Bird
516	The Peri and Child	ditto
517	The Shepherd Boy	ditto

518 Portrait of Earl of Beaconsfield (copy) Wm. Wallace Stevens
519 ditto W. E. Gladstone (do.) ditto
520 Drawing suggested by China Dish ... Theresa Hoblyn

Sculpture, Architecture, Ornamental Art.

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531 Plaque, Water Lily, ... Bessie de Witt 1 0 0
532 do. Pelargoniums ... ... Agnes Coates
533 Brass Repoussé work plate ... Agnes S. Bainbrigge
Second Bronze Medal
534 Pair Repoussé door plates, Jessica Middleton ... 0 8 0
535 Going to School ... ... Catherine C. Budd
536 Our Pets ... ... do.
537 Brass Repoussé Sconce, Katherine R. Shortland 1 10 0
538 Copper ditto panel, Hart's Tongue do. ... 0 10 0
Prize 10s.
539 Brass ditto, Colt's Foot do. ... 0 10 0
540 Brass Sconce Sunflowers, Margaret R. Shortland 1 10 0
541 do. do. Ivy do. 0 10 0
542 Mirror with China Tiles, A. R. Popham ... 4 10 0
543 Plaque, Arum Lilies, Ida C. Wickett ... 5 0 0
544 Specimens of Ornamental writing on Glass, embossed Silver and Gold enamel plate Wm. J. Leggett
545 Specimens of ornamental writing for shop fronts do.
Commended
546 Popular Papers on Architecture ... Wm. E. Hill
Commended
547 Easel, decorated in Lincrusta Walton ... Fredk. Walton & Co.
548 Ditto ditto ... ditto
First Bronze Medal
549 Various Panels ditto ... ditto
550 Ditto Mats ditto ... ditto
551 Series of designs for Internal House Decoration, designed and drawn by James Millier ... ... Phillips & Co.
Second Silver Medal to Designer
552 Painted Table ... ... Evelyn Leggoe
First Bronze Medal
553 Japanese Fret Work Cabinet ... .. Joseph Roberts
554 Designs for Lodges and Cottages (3 frames) ... W. E. Hill
First Bronze Medal

555 Terra Cotta Bust, Richard Baxter, Esq., F.R.G.S.
George Burnard
Second Silver Medal
556 Terra Cotta Group, "A Tiff" ... G. Arthur Burnard
First Bronze Medal
557 Folding Screen, Landscapes, (adapted) M. Claudine Coode.
558 Carved Oak Coffer, made out of old beams from Salisbury Cathedral ... ... Harry Hems.
Second Silver Medal
559 Pair Painted Drain Pipes (for Umbrella Stand), C. W. Hockin
560 Case containing specimens of antique and modern china ... ... Thos. Oatey
561 Piskie Throne from the roof of an old Cornish Cottage ... contributed by Mrs. Enys
562 Fancy Table and Cross together containing 2,920 pieces, made without nails or glue ... ... T. Wellington
563 Sunset (Terra Cotta) ... ... Agnes Coates 15 0
564 Plaque "Lilies" ... ... A. R. Popham 6 6 0

THE ALLER POTTERY Co.

565 Specimens of Pottery ... ... executed by W. White
Highly Commended
566 do. do. do. ... ... W. F. Young
Highly Commended
567 do. do. do. ... ... T. Mellor
Second Bronze Medal
568 do. do. do. ... ... S. Kirkham
First Bronze Medal
569 do. do. do. ... ... G. Dart
Second Bronze Medal
570 do. do. do. ... ... F. Findley
Highly Commended
571 do. do. do. ... ... F. Lewis
First Bronze Medal
572 do. do. do. ... ... J. Budd
Highly Commended
573 do. do. do. ... ... Blight Norris
Highly Commended
574 do. do. do. ... ... E. Gribble
Highly Commended
575 General collection Aller Pottery ... ... Aller Pottery Co.
576 Pair Terra Cotta Plaques, Flowers from nature, Mary Mason
577 Collection of Corean Carvings, lent by
J. Burton, Falmouth.
578 Massive Nankin China Vases ... ... ditto
579 Bronze Vases ... ... ditto
580 Oak Carvings ... ... contributed by Mr. N. Fox

PROFESSIONAL PHOTOGRAPHY.

631	Feeding the Calves	H. P. Robinson	1	1	0
632	The Music of the Birds	ditto	1	1	0
633	A Chat with the Miller	ditto	1	1	0
634	Yn Cymraeg a Saesneg	ditto	1	1	0
635	He loves me? loves me not?	ditto	1	1	0
636	The mill door	ditto	1	1	0
637	The Stream in Summer	ditto	1	1	0
638	He never told his love	ditto	1	1	0
639	The shortest way in summer time	ditto	1	1	0
640					
641	Sad Moments	Walter W. Winter	1	10	0
		First Silver Medal			
642	Spring blossom	ditto	1	10	0
643	Gipsy Charmer	ditto	1	10	0
644	At home	ditto	1	10	0
645	Just off	ditto	1	10	0
646	Summer Flowers	ditto	1	10	0
647	Repose	ditto	1	10	0
648	Red Carbon Photographs of children	W. J. Byrne	12	12	0
649	The Miser	Wm. Gillard			
		First Silver Medal			
650	Group of two Children	W. M. Harrison			
651	Group of Cricketers (enlargement)	ditto			
652	Portrait of a Lady (ditto)	ditto			
653	Portrait, Mrs. Rogers (ditto)	ditto			
654	Little Samuel (ditto)	ditto			
655	Little Boy (ditto)	ditto			
656	The late Mr. Richard Spry (ditto)	ditto			
657	Fishing Boats going to Sea	ditto	1	1	0
658	General View of Falmouth	ditto	0	12	6
659	The Steeple Rock, Kynance	ditto	0	12	6
660	Helford River	ditto	0	12	6
661	Ditto ditto	ditto	0	12	6
662	Instantaneous Studies of Shipping,	John H. C. Harrison			
663	ditto ditto	ditto			
664	ditto ditto	ditto			
665	Instantaneous Studies of high seas, and breaking waves	W. P. Marsh			
		First Bronze Medal			

666	Frame Cabinet Photographs,	Ernest C. Bowker			
667	“This little pig went to market”	Fredk. Whaley	2	2	0
668	“Waiting for Nurse”	ditto	2	2	0
669	“After the Day's Toil”	ditto	5	5	0
670	A Copper, Sir	ditto	1	1	0
671	The Priory, Shanklin	J. Milman Brown	0	12	6
672	Autumn Sunshine	ditto	0	12	6
		Highly Commended			
673	Home Cottage, Shanklin	ditto	0	12	6
674	Church Lane, Shanklin	ditto	0	12	6
675	Fredk. Neville Leveson Gower,	Robt. Faulkner	16	15	0
676	Frame of Instantaneous Photographs of Children	ditto			
677	Master Herbert	ditto	10	10	0
678	Lady Sybil Mc Donnell	ditto	11	15	0
		Highly Commended			
679	Frame of three Portraits	Wm. Gillard			
680	Blasted Oak Tree on the Allen.	J. P. Gibson	0	10	6
681	On the Tyne, at Bywell	ditto	0	10	6
682	An Autumn Evening on the South Tyne,	ditto	0	10	6
683	On the Allen, at Staward	ditto	0	10	6
684	Reading the News	John Terras	0	10	6
685	Spinning	ditto	0	10	6
686	A Portrait	ditto	0	10	6
687	A Study	ditto	0	10	6
688	Fishing	ditto	0	10	6
689	Group of Wild Roses	A. Hendrey	0	8	6
690	Group of Passion Flowers	ditto	0	8	6
691	Group of Gloire de Dijon Roses in Vase,	ditto	0	8	6
692	Group of Baroness Rothschild Roses in Basket	ditto	0	8	6
693	The First Lute	ditto	0	8	6
		Highly Commended			
694	Temptation brings me here	ditto	0	8	6
695	The Cuckoo. “That cry, which makes me look a thousand ways, in bush & tree & sky,”	Hy. P. Robinson	2	2	0
		First Silver Medal			
696	Frame of Views	John Jackson	1	1	0
697	Ditto Cheddar Cliffs	ditto	1	10	0
698	Ditto ditto	ditto	1	7	0
699	Interiors of Lincoln Cathedral	George Hadley			
		Second Silver Medal			
700	Ceramic Enamels	P. M. Laws			
701	Great Grandmother	Luke Berry	0	15	0
702	Moorland	ditto	0	15	0
703	When we were boys together	ditto	0	15	0

[illegible]	[illegible] Lancers Pass, N. Wales ...	Luke Berry	0	15	0
		Second Silver Medal			
[illegible]	[illegible] the Ferns ...	ditto	0	15	0
[illegible]	[illegible] collecting Sheep [illegible] ...	ditto	0	15	0
[illegible]	[illegible] Photograph	George Renwick			
[illegible]	[illegible] ditto	ditto			
[illegible]	[illegible] Portraits	Wm. G. Honey			
[illegible]	[illegible] Children [illegible] ...	ditto			
[illegible]	[illegible] belonging to the Royal Institution of Cornwall	Contributed through Dr. Barham			
[illegible]	Finished Carbon Enlargement, Tiger's Head	Thos. Jas. Dixon	5	5	0
		Second Silver Medal			
[illegible]	Ditto ditto Eagle ...	ditto	4	4	0

AMATEUR PHOTOGRAPHY.

801	The Otter Pool, Old Down Wood ...	Rev. Henry B. Hare			
802	The Rivers Meet, Forebury	ditto			
803	The Ford	ditto			
804	River View, Great Elm	ditto			
805	At Home and Abroad	Andrew Pringle			
806	A Study	Alexander Millar			
807	Artists' Studies from Nature,	Domenico Barnett	4	4	0
808	ditto ditto	ditto	4	4	0
809	Views among the English Lakes ...	Andrew Pringle			
		With 805, First Silver Medal			
810	Interior Views	Thos. Hy. Martin, M.D.			
811	ditto	ditto			
812	Interior of St. John's Cathedral, Malta,	Alfred G. Tagliaferro			
		Second Silver Medal			
813	do. Monuments of Knights of Malta,	ditto			
	Drawing Rooms	ditto			
	Instantaneous Studies ...	ditto			
	graphs taken during the 6th cruise of Dutch oner William Barrents	W. J. Grant			
		First Bronze Medal			

817 A Forest Home ... . Robt. R. Hopkins
818 Stonehenge ... ... ditto
819 Mill on the Stour ... ... ditto
820 Sea-scapes (Instantaneous Views) ... P. H. Emerson, B.A
Second Bronze Medal.
821 Cambridge Market-woman ... ... ditto
822 East Anglian Fisherman ... ... ditto
Highly Commended

PHOTO APPLIANCES.

851 The Practical Re-touching Desk ... ... Geo. Atkinson
852 Photographic Plate Washing Cabinet, Francis Burdett Dagley
Second Bronze Medal
853 Box for carrying Photographic Plates, which can be examined without opening the box ... Francis Burdett Dagley
854 One Case of Tubes, &c. (for Magic Lantern Apparatus
Robert R. Beard
855 Patent Self-centering Slide Carrier for Lantern. ditto
856 Ditto ditto ditto ditto
Second Bronze Medal
857 Drawing of Screw Regulating Tap ... ditto

NATURAL HISTORY.

871 Collection of Local Botanical specimens
Arthur Ed. Fox
Prize £1
872 Case of Frogs ... ... Thomas Haygreen
Prize 5s.
873 Volcanic Rocks of Cornwall, with 59 microscopical slides T. Clark
874 Paper, descriptive of ditto ... ditto
First Silver Medal

875 Case of Volcanic Tuffs and Breccias from Meneage with 11 microscopical slides
Howard Fox

876 Map, 25 inches to the mile, shewing the positions of the so-called "conglomerates" of Meneage, from which specimens of tuff or breccia exhibited by Mr. Howard Fox were taken

877 Pumice Stone, picked up floating in Baly Straits, 600 miles from Krakatoa, 4 months after the explosion ditto

878 Elephant's Tusks ... ... N. Norris

879 Book of rough sketches of Spots on the Sun ... ... Rev. Wm. Rogers

880	Case containing small plaice	Henry Howard Bunn	0	7	6
881	,, large common dab	,,	0	7	6
882	,, 3 large smelts	,,	0	15	0
883	,, 1 sea bream	,,	0	7	6
884	,, 5 sprats	,,	0	10	0
885	,, 1 great weaver	,,	0	7	6
886	,, common sole	,,	0	7	6
887	,, 6 perch	,,	0	10	0
888	,, 1 gray mullet	,,	0	12	0
889	,, 2 large mackerel	,,	1	1	0
890	,, garfish	,,	0	10	0
891	,, herring	,,	0	10	0

Second Bronze Medal

894 Case of British Butterflies, collected by exhibitor,
Edward Bridges, age 14
Prize 2s. 6d.

895 2 Books of British Seaweeds ... ... R. V. Tellam
First Silver Medal

896	A True Wild Cat (Felix Catus), caught in Lincoln	W. Barber	100	0	0
897	Lamp Sucker & Dogfish, Pipe Fish etc.	ditto	5	0	0
898	River Lamprey	ditto	3	10	0
899	English Ermine, Winter coat ...	ditto	1	0	0
900	Pair Robins mounted on Snow ...	ditto	1	0	0
901	Pair of Fox Heads	ditto	1	5	0

First Silver Medal

902 Meteorological Summary and Calendar of Nature for the years 1878-83 ... James Gray Wells

903 Specimens of Stream Tin, three larger ones found in Roche, the smaller one in St. Neot Martin Bros

904 Specimens of Pilchards, age varying from one month to two years ... ... Matthias Dunn
905 Microscopic Slides ... ... ditto
First Bronze Medal
906 Improved Crab and Lobster Pot ... W. S. Hearder
907 Diagrams representing floating particles of volcanic matter from the eruption of Krakatoa and Mount St. Augustin, as seen under a Microscope—lent by W. F. Stanley, F.G.S

(N.B.—His Lecture and explanation of Diagram can be inspected on applying to the Secretary.)

908 Tusk of Narwhal ... contributed by Mr. N. Fox
909 Ditto Hippopotamus ... ditto ditto
910 Piece of Bone ... ... ditto ditto

SHORTHAND.

H. Williams	*Prize* £1	0	0
Mary U. Francis	„	0	15	0
William Opie	„	0	15	0
W. J. C. Gummow	„	0	10	0

"LANDER" MAPS.

921 Map and Essay, N.W. Territory of Canada ... J. W. Andrew, age 13
Prize 5s.
922 ditto ... ... Frank Loosemore, age 12
923 ditto ... ... James Laverty, age 15
924 ditto ... ... James Houghton, age 13
925 ditto ... ... Thomas Michell, age 16
926 ditto ... ... E. J. James, age 17
Prize 5s., (Map only)
927 ditto ... ... John Corder, age 13
Prize 5s.
928 ditto ... ... W. D. Lawry, age 13
Prize 7s. 6d.
929 ditto ... ... Fredk Lovell, age 13
Prize 7s. 6d.
930 ditto ... ... H. A. Clear, age 15
931 ditto ... ... R. H. Paynter, age 12

932	ditto (3 maps)	Reg. A. Shoosmith,	age 16	*Prize, 25s.*
933	ditto	Thomas Chapple,	age 17	
934	ditto	Watie Chapple,	age 15	
935	ditto	Arthur Corder,	age 15	

NEEDLEWORK.

Maria Camilla School.

940	Stockings	Lena Rowe,	age 12	
941	Skirts	ditto		
942	Darning	ditto		
943	Darning and mending	R. Somerville,	„ 12	
944	Stockings	ditto		
945	Drawers	ditto		
946	Hemming	L. J. Simmons,	„ 14	
947	Petticoat	ditto		
948	Shirt	Hester Smith,	„ 11	*Prize 2s.*
949	Pillow case (mending)	ditto		
950	Shirt	J. Thomas,	„ 13	
951	Stocking	ditto		
952	Pillow Case	S. Bath,	„ 13	
953	Bodice	ditto		
954	Stockings	A. P. Martin,	„ 14	
955	Bodice	ditto		
956	Pillow Case	ditto		
957	Dress	E. Tonkin,	„ 15	
958	Crochet	A. Hawken,	„ 15	

Enys School.

959	Specimens	L. Bennett,	age 11	*Prize 2s.*
960	ditto	Several Girls.		
961	Shirt	cut and made by B. Barrows,	„ 13	
962	Chemise	G. Lawrence,	„ 10	
963	ditto	E. James,	„ 10	*Prize 1s.*
964	Night Dress	K. Martin,	„ 9	

British School.

965	Night Dress	E. Lobb,	„ 13	*Prize 3s.*
966	ditto	M. Corfield,	„ 14	*Prize 3s.*

Truro Wesleyan Day School.

967	Night Dress	K. Penrose, age 14
968	Chemise	F. Penrose, „ 12
		Prize 1s. 6d.
969	Shirt	A. Symons, „ 12
970	Chemise	A. Penrose, „ 8
		Prize 1s. 6d.
971	Stocking	ditto
972	Stockings	A. Penrose, „ 14
973	ditto	A. Symons, „ 12
		Prize 2s.
974	ditto	F. Penrose, „ 12
975	Night Dress	S. Keverne, age 64
		Prize 2s. 6d.

FANCY WORK.

980	Crochet work	J. Caldwell, age 13
981	Patchwork Toilet Bags	Emma Dawe
982	ditto	ditto
983	ditto Cushion	ditto
984	ditto	ditto
985	ditto	ditto
986	ditto	ditto
987	Patchwork	ditto
988	ditto	ditto

ART NEEDLEWORK AND BRITISH LACE.

1	Lace Handkerchief	E. F. Smart	0	14	6
2	One and half yards of Lace	ditto	1	16	0
3	Ties	ditto	0	3	6
4	Baby's Veil	ditto	0	11	0
5	Neckerchief	ditto	0	9	0
6	Collar and Cuffs	ditto	2	0	0
		Highly Commended			
7	Bib and Sleeves	ditto	0	10	0
8	One yard Lace, Sunflower	ditto	0	14	0
9	Quarter yard Sample Lace @ per yard	ditto	3	10	0
		Prize 10s. 6d.			

10	Three yards Lace ... @ per yard	E. F. Smart	0	11	6
11	Two & three quarter yds. „ ditto	ditto	0	11	6
12	One yard fine Lace ... ditto	ditto	1	15	0
		Prize 10s. 6d.			
13	Two yards „ (in two lengths) ditto	ditto	3	0	0
		Highly Commended			
14	Neckerchief	ditto	0	9	0
15	Sample of fine old Muslin Work, over 200 years old	ditto	5	0	0
16	Black Satin Satchel, daffodils and grasses,	Jessie C. Kempthorne			
17	Table Cloth, with worked corners	ditto			
		Highly Commended			
18	Table Cloth	Mrs. Slade Olver			
		Highly Commended			
19	Three Panels for Screen, worked in Silks on Tussore,	A. C. Hutchinson	4	0	0
		Prize 10s. 6d.			
20	Curtain (unfinished) from an early Italian Design, by Mantegna (1431-1506),	the Misses Genn			
		Prize 10s. 6d.			
21	Cushion in Silk Crewels ...	Katie Chellew			
22	Macramé work, one pair Wall Pockets,	Gustavus E. Liddell	0	12	6
23	ditto Hand Bag	ditto	0	10	6
24	ditto ditto	ditto	0	10	6
25	ditto Work Basket	ditto	1	5	0
26	ditto Open Basket	ditto	0	12	6
	(22 to 26 to be sold in aid of Bodmin Church restoration fund)				
27	Mantle Border, Wild Roses,	Mary E. Polkinghorne			
28	Chair Back, Jessamine and Rosebuds	ditto			
29	Bracket, Jessamine and Carnation	ditto			
30	Five o'clock Tea Cloth, original design,	Mary Mason	2	0	0
31	Side Board Cloth on linen drill embroidery in Indian Tussore Silk	Caroline M. Harding	1	1	0
		Prize 5s.			

Copies of HISTORICAL SYNOPSIS OF R. C. POLYTECHNIC SOCIETY may still be obtained—price, 1s.

The Society does not hold itself responsible for any accidental errors in the Catalogue.

Under the Sanction of the Board of Trade

THE

ART UNION OF CORNWALL.

President ... *RIGHT HON. EARL OF MOUNT EDGCUMBE.*
Honorary Secretary ... ... *W. W. J. SHARPE.*
Honorary Treasurer ... ... *R. M. TWEEDY.*
Manager ... ... *E. KITTO.*

The Fine Arts Department is one of the principal attractions of the Polytechnic Exhibition, and the chief inducement to Artists exhibiting is the sale of their pictures; for which purpose the Art Union is mainly established, and through the agency of which most of the purchases are effected.

The number and value of the prizes will depend on the number of tickets sold, and they may be selected by the holders of winning tickets from any of the Water-colour or other Drawings, Oil Paintings, Sculptures, or Photographs, for Sale, in the Fine Arts Department of the Exhibition.

The list of Prizes will be published and Prize-holders advised of the result immediately after the Drawing, which will take place at the Polytechnic Hall, on Friday, August 15th, at 9 p.m.

The Shares are fixed at 1s. each, and any number may be purchased of the Manager; or of

W. W. J. SHARPE, Hon. Secretary.

LAKE & Co., STEAM PRINTERS, FALMOUTH.

PRIZE LIST, 1885.

ROYAL CORNWALL

POLYTECHNIC SOCIETY

FOR THE ENCOURAGEMENT OF

SCIENCE AND THE FINE AND INDUSTRIAL ARTS.

INSTITUTED 1833.

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ROYAL CORNWALL
POLYTECHNIC SOCIETY.

THE FIFTY-THIRD

ANNUAL EXHIBITION

WILL OPEN AT THE

POLYTECHNIC HALL, FALMOUTH,

On TUESDAY, September 22nd, 1885.

The ART UNION of CORNWALL

(UNDER THE SANCTION OF THE BOARD OF TRADE),

Selects its Prizes from the Works exhibited by Professional Artists.

The Drawing for Prizes will take place at the Polytechnic Hall during the Exhibition.

* Information respecting the Photographic department may be obtained from Mr. W. BROOKS, Laurel Villa, Wray Park, Reigate, (member of the General Committee).

Information respecting the Art Union may be obtained of the Honorary Secretary, Mr. W. W. J. SHARPE, Falmouth.

All information may be obtained personally, or by letter, on application to the SECRETARY,

EDWARD KITTO, F.R.Met.Soc.,
POLYTECHNIC HALL, FALMOUTH.

FIFTY-THIRD

ANNUAL EXHIBITION

REGULATIONS FOR COMPETITION.

1. Competitors are divided into two classes.

2. The FIRST CLASS consists of Members of the Society, and of any person paying three shillings to be allowed to compete for Medals and Prizes, who shall be entitled to a non-transferable ticket admitting once to the Exhibition.

3. The SECOND CLASS consists of persons of the working order and persons under sixteen years of age. Second class competitors may compete for Medals and Prizes without any subscription, but are not entitled to free admission to the Exhibition.

4. No competitor shall be entitled to a medal or prize for any article which has appeared at a previous Exhibition of the Society, unless showing some improvement.

5. When medals are awarded, the converting them into money according to the following scale shall be at the discretion of the Committee, provided that the applicant already possesses a medal of similar value : —

First Silver Medal	£5	0	0
Second ditto	3	10	0
First Bronze Medal	2	0	0
Second ditto	1	5	0

6. Medals only (not convertible into money) can be awarded to patented or registered articles.

7. No holder of a medal or prize may receive an award of the same or a lower value for similar subjects in the same department at the next two subsequent Exhibitions; but the Committee are empowered to give certificates of merit to persons excluded by this rule.

8. The Committee are empowered to withhold any medal, prize or premium, at their discretion.

9. Every Exhibitor must sign the Entry Form, to be obtained of the Secretary, before his exhibit can be received by the Society.

10. *All Articles intended for exhibition must be delivered at the Polytechnic Hall, Falmouth, not later than Tuesday, September 15th, or they will not be eligible for competition.*

Medals and Prizes.

MECHANICS.

Medals and Prizes in Books or Money are offered by the Society for useful Inventions or Improvements, which must be explained by models or drawings and full descriptions. The drawings to be sufficiently large to be distinctly seen. All descriptions and communications should be written on foolscap paper, on one side only, leaving one inch margin.

Sec. 1.—Steam Engines & Boilers & Machinery connected therewith, &c.

Medals are offered by the Society for :—

1. The best Safety Appliance for securing Skips or Cages adapted for use in Cornish Mines.
2. The best Method of Construction of Cornish Boilers, having in view the lessening of the effects of the corrosive action of the impure water in Cornish Mines.
3. The best non-conducting material (harmless in its effect on metals) for covering Steam Boilers, Cylinders, and Steam Pipes, to be tested in competition as to its waterproof qualities, efficiency in resisting the radiation of heat, facility in use, durability, and economy of cost.
4. Improved Stamping Machinery.

NOTE.—Every facility will be given by the Society for exhibiting all machinery, which will be placed under cover.

In addition to the Medals and Prizes offered by the Society, the following Premiums are open for Competition :—

1. DRESSING ORES. A Premium by the Society for improved Machines for, or modes of, Dressing Ores.
2. COLLECTIONS OF ORES. A Premium is offered by the Society for Collections of Ore and Matrix in which the relations of one to the other are carefully marked.
3. CROSS SECTIONS. A Premium not exceeding £3, by the Society, for accurately-drawn cross sections of Cornish Mining districts.

Medals and Prizes in Books or Money are offered for Essays and Scientific Papers.

SPECIAL PREMIUMS.

1 IMPROVED TREATMENT OF ORES AND MINERALS. Three Premiums, in Books, by the Editor of the *Mining Journal*, value £3 3s., for the best, £2 2s., for the second-best, and £1 1s., for the third-best papers, by practical Miners or others engaged about mines, upon a method, mechanical or chemical, of making marketable, with commercial advantage, ores or minerals raised from mines in Cornwall or Devon, and hitherto regarded as worthless. The books shall be chosen by the writer of the paper. In the case of mechanical methods not in actual use, it must be demonstrated that the apparatus is simple, durable, and not likely to get out of order. In case of chemical methods not in actual use, samples of the products in the various stages must accompany the paper, in proof of the practicability of the process.

2. MINERAL VEINS. A Premium of £2 by the Society, and £3 by Colonel Tremayne, for the most exact account of the phenomena of mineral veins in any mine or district; their dip, direction, variations in productiveness slides, heaves, &c.

3. DUTY OF CORNISH ENGINES. A Premium is offered by the Society, for the best Essay treating on the reasons for the diminished duty of Cornish Pumping Engines, and giving practical suggestions for its improvement.

All papers in this section must be sent to the Secretary AT LEAST THREE WEEKS before the Exhibition commences.

Sec. II.—Sanitary and Domestic Inventions and Improvements.

1. A Premium is offered by the Society for improved Stoves for economising fuel.

2. A Premium is offered by the Society for an improved system of Ventilation of Dwellings and Public Buildings.

3. A Premium is offered by the Society for improved methods of making casement windows weather-tight.

4. A Premium is offered by the Society for the best model of a Cottage Roof—span not exceeding 20 feet.

Sec. III. Other Branches of Mechanics.

The Society offers Medals and Prizes in Books or Money for :—

1. Useful Inventions and Improvements.
2. Models or drawings of Machines or Mechanical Appliances by workmen and apprentices.
3. Specimens of good Workmanship by Amateurs, Workmen or Apprentices.

PRIZES OFFERED TO APPRENTICES.

1. Prize of 10s. 6d. for the best specimen of Joinery, by boys under 17.
2. " 7s. 6d. " " " " 15.
3. " 10s. 6d. for the best specimen of Wood Carving, by boys under 17.
4. " 7s. 6d. " " " 15.
5. " 10s. 6d. for the best specimen of Wood Turning, by boys under 17.
6. " 7s. 6d. " " " 15.

The judging in all departments of the Exhibition (except Shorthand) will take place on Monday, September 21st.

NAVAL ARCHITECTURE.

Medals and Prizes, in Books or Money, are offered by the Society for meritorious productions in the various branches of Naval Architecture.

A Medal is offered by the Society for the best Model illustrating an improved method of lowering and disengaging boats from a ship's side with speed and safety.

STEAM FISHING VESSELS. A medal is offered by the Society for the best model illustrating the employment of Steam in Fishing Vessels, accompanied by drawings and description; the objects to be aimed at being the reduction of manual labour on board, freedom from injury to nets or lines, and means of bringing the produce quickly and economically to market.

A Premium is offered for the best means of preventing the influx of water into the boiler and engine-room compartments of steam vessels.

CHEMISTRY, ELECTRICITY, &c.

Medals and Prizes in Books or Money, are offered by the Society for improved applications of Chemical Science.

Prizes are offered to Students and Workmen for Analyses of Minerals.

Prizes are offered for Monographs on any groups or families of Salts, as the Phosphates, Arseniates, &c., whether occurring naturally or not.

Prizes are offered for Collections of Artificial Crystals.

A Premium is offered for any new and successful experiment in the application of the Electric Light for use in mines, or otherwise.

FINE ARTS.

Medals and Prizes are offered by the Society for meritorious productions in the following subjects:—

Sculpture and Modelling—Architecture—Art Metal Work—
Original Designs adapted for Manufactures in Serpentine,
Granite, Porphyry, Terra Cotta, &c.

PROFESSIONAL ARTISTS.

The Society invites Professional Artists to forward their works to the Exhibition. THE ART UNION OF CORNWALL selects its Prizes from the pictures exhibited by Professional Artists.

AMATEURS.

Section I.—Oil Paintings and Water Colours..

1. For the best original Figure Picture in Oil—a Silver Medal.
2. For the best original Figure Picture in Water Colour—a Silver Medal.
3. For the best original Landscape in Oil—a Silver Medal.
4. For the best original Landscape in Water Colour—a Silver Medal.
5. For the best China Painting, original design—a Silver Medal.
6. For the best China Painting, design not original—a Bronze Medal.

NOTE.—All Persons who have ever sold a Picture from an Exhibition shall be deemed *Professional.*

Prizes of 15s and 7s. 6d. are offered for Water Colour Drawings by persons under 16 years of age. The age to be stated.

Section II.—Pencil, Crayons—Engraving and Etching—Lithography, &c.

PREMIUMS.

£2 is offered by the Society for the best wall or other House decoration, including designs for Needlework.

£1 is offered by the Society, to persons under 20 years of age, in each of the following subjects:—

1. For the best filled Sketch-book, from Nature.
2. For the best series of six Flowers, Leaves, or Animals, from Nature, in Chalk or Pencil.
3. For the best shaded Crayon Drawing of one of the busts in the Polytechnic Hall, full size; or the bust of any well-known character.
4. For the best Engraving on Wood.
5. For the best sketch of Marine Scenery.
6. For the best Studies of Boats, fishing luggers, trawlers &c., in pencil, water colours, or oils.

Prizes of 10s. and 7s. 6d. are offered for Pencil and Crayon Drawings of flowers from Nature, or of Natural Objects, by persons under 16 years of age. The age to be stated.

PHOTOGRAPHY.

In all cases state whether the work is Professional or Amateur, and name process of production.

All works sent for competition must have been executed within eighteen months of the date of this Exhibition.

Carte-de-visite Portraits are excluded from Exhibition, except when illustrating some special process or novelty.

PROFESSIONAL PHOTOGRAPHERS.

Medals are offered by the Society for meritorious productions in the following subjects:—

1. For Landscapes.
2. For Portraits.
3. For Composition Pictures.
4. For Instantaneous Pictures.
5. For Interiors.
6. For Transparencies for Lantern or Window Decoration.
7. For Pictures by improved processes.
8. For Enlargements.

All enlargements for competition must be the work of the Exhibitor.

AMATEURS.

Medals are offered for meritorious productions in this department.

PHOTOGRAPHIC APPLIANCES.

Medals are offered for improved Apparatus and Appliances, including Magic Lantern Apparatus, &c.

All exhibits in this department must be accompanied by a written explanation of their specialities.

NOTE.—Regulation 7 does not apply to the Photographic Department for this year.

* See foot note, page 2.

NATURAL HISTORY.

Essays, Local Observations, Collections of Specimens, particularly such as illustrate the Natural History of the County.

All papers in this Section must be sent to the Secretary at least three weeks before the Exhibition commences.

Specimens must be properly arranged and accurately named, and should be accompanied by a paper stating when and where they were found, &c., and when practicable by observations made by the exhibitor.

Prizes will be especially given for Monographs of any particular family or large genus indigenous to the County, either in Botany or Zoology, such as the *Gramineæ*; or *Ericaceæ*; the *Holothuridæ* or the *Medusæ*; the *Palmipedes*: the *Rodentia*; &c.

A Medal is offered by the Society for the best Incubator. Preference will be given to the Exhibit in which chickens are to be seen in the course of being hatched, and recently hatched.

Prizes are offered for the following objects :—

1. Aquaria.
2. Collections of Wild Plants—distinguishing between those which are poisonous and those which are not poisonous.
3. Insects (named and classified) which are noxious to vegetation.

SPECIAL PREMIUMS.

1. A Premium of £2, or books to that value, at the discretion of the Judges, for the best Illustrated Journal of Natural History.
2. A Premium of £2, or books to that value, at the discretion of the Judges, for the best Calendar of Nature, presenting in a tabular form the comparative view of the dryness or moisture of different years; exhibiting also the advance of the season by the time at which various trees, plants, &c., burst into leaf or flower—taking of course, the same trees each year.
3. A Premium of £2 by the Society, for the best paper recording personal observations and experiments as to the movements of carnivorous plants.
4. A Premium of £2 by Mr. Alfred Lloyd Fox, for the best collection of Cornish Fossils, to be accompanied by descriptions, &c.
5. A Premium of £1 by Mr. T. Webber, for Specimens of Amateur Bird-stuffing—for a case of not less than two birds—particular attention to be paid to natural size and position.
6. A Premium of £1 by the Society, for specimens of setting up of fish.
7. A Premium of £2 by Mr. George H. Fox, for the best Essay on the Migratory Birds of Cornwall.
8. A Premium of £1 by the Society, for the best collection of Bee Hives.
9. A Premium of £1 by the Society, for the best collection of Bee Furniture and Appliances.
10. A Premium of £1 for ten original Illustrations of the Natural Families of Plants from Nature. The Candidates to be under 16 years of age. The age to be stated.

LANDER PRIZES.

The Prizes to be called the "Lander Prizes" in commemoration of those enterprising Cornish Travellers, Richard and John Lander.

Competitors must be under* 18 *years of age, and the age to be stated; the work not to be done during school hours.

Subject for 1885—Afghanistan & the Punjab.

Mr. J. C. Kennerley offers to the Society, four several prizes, of 25s., 15s., 12s., and 8s., for neat and correct Maps of Afghanistan and the Punjab. The principal rivers, lakes, chains of mountains, and the territorial line should be accurately delineated; and the sites of the most important cities should be correctly marked, also the lines of railway projected. The Maps should be accompanied by the best information (with reference to authorities, which must be quoted) respecting the great physical features of the country, its rivers, the characteristics of the principal chains of mountains, their general direction, height, geological and mineralogical features, more important passes, limits of perpetual snow, and the elevations at which various trees and plants will flourish on their sides ; or information respecting its history, the population of its principal towns, statistics of its trade and manufactures, or the natural productions of the country, zoology, botany, &c. A really good map, if the essay be incorrect or inadequate, to be entitled to one-half of the relative prize, and *vice versa* as to good essays, but imperfect maps.

It is not expected that each map will be accompanied with information on all the subjects specified; they are named as affording hints to guide the competitors, and prompt them to research, and method in arrangement.

Maps and Essays (not to exceed 20 pages) must be sent to the Secretary AT LEAST THREE WEEKS before the exhibition commences.

SHORTHAND.

Competitors must be under 30 *years of age, and the age to be stated.*

Prizes are offered by the Society for proficiency in the use of Shorthand to *non professional* writers of it, resident in Cornwall. The skill of the candidates to be tested by their several readiness and accuracy in taking down passages from a book or newspaper read in their presence, and afterwards giving a copy of the shorthand in ordinary writing. First Prize, £2; Second Prize, £1 ; Third Prize, 10s.

Pitman's or any other system, may be used, and arbitrary marks for prepositions, conjunctions, personal pronouns, parts of the verb "to be" and terminations, such as *ion*, *ing*, &c.

NOTE.—Competitors to be in attendance at the Polytechnic Hall, Falmouth, on Saturday, September 19th, at 3 o'clock p.m.

ART NEEDLEWORK.

Medals and Prizes are offered by the Society in the following subjects:

1. Original Specimens of Art Needlework in South Kensington Embroidery.

2 Specimens of Art Needlework, not original.

BRITISH LACE.

Medals and Prizes are offered by the Society for Specimens of British Lace.

Note.—All work for Competition must be done by the Exhibitor.

THE JUDGING in all departments of the Exhibition (except Shorthand) will take place on MONDAY SEPTEMBER 21st 1885.

* * *

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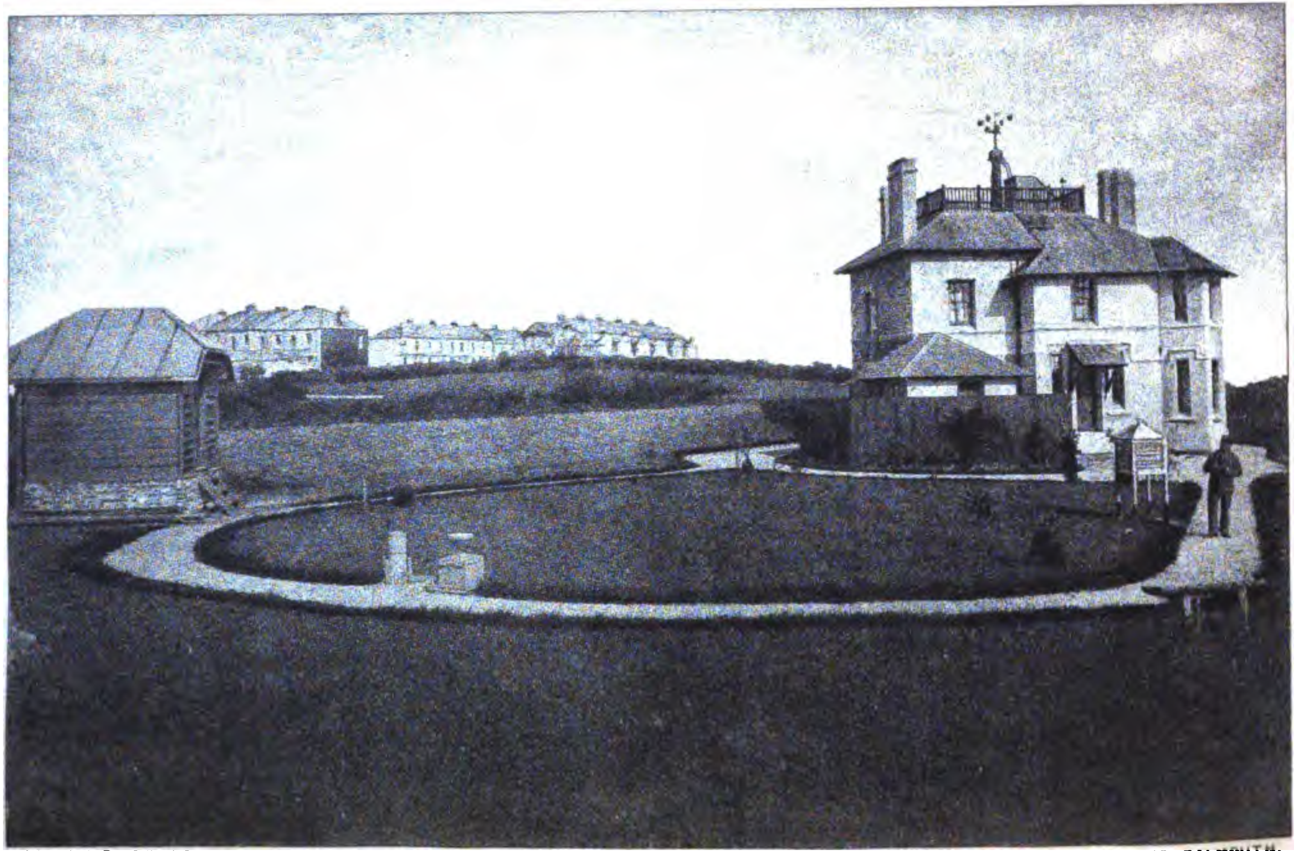

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Polytechnic Society.

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THE FIFTY-THIRD

ANNUAL REPORT.

1885. 1885.

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Royal Cornwall Polytechnic Society.

PATRONESS:
HER MAJESTY THE QUEEN.

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EDWARD KITTO, F.R.Met.Soc.

CURATOR:
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Robert Hunt, F.R.S.
Professor Balfour Stewart, F.R.S.
James Glaisher, F.R.S., F.R.A.S.
Wm. Wagner, LL.D.
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W. Pengelly, F.R.S., F.G.S.
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C. W. Peach, A.L.S.
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J. W. Swan, F.C.S.
His Grace the Archbishop of Canterbury.

Committee.

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W. Naylor Carne.
R. Carter.
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Lady Graves Sawle.

BODMIN DISTRICT.

Right Hon. Lord Robartes.

PLYMOUTH DISTRICT.

Francis E. Fox, B.A., F.R.G.S.
R. J. Frecheville, F.G.S.

LONDON DISTRICT.

W. Brooks.

List of Presents to the Library.

1885.

American Geographical Society.—Bulletin, 1884.

American Philosophical Society.—Proceedings, Vol. XXII., Pts. 1 to 4.

Alpine Winter in its Medical Aspects.—By E. T. Wise, M.D.

Annual Report of Dulwich College Society.—1884-5.

Annual Report of the Surgeon-General.—U.S. Army, 1885.

Astor Library.—Annual Report, 1884.

Bristol Naturalists' Society.—Vol. IV., Pt. 3, 1884-5.

Butterflies of the Malay Peninsula, Pts. 1-7.—By W. L. Distant.—Presented by G. Turner.

Chemical Society.—Journal, 1885.

Contributions to our knowledge of the Meteorology of the Arctic Regions, Pt. 4.—From the Meteorological Office.

Extinct Lake of Bovey Tracey.—Abstract of Lecture by W. Pengelly, F.R.S., F.G.S.—From the Author.

Edinburgh Geological Society.—Transactions, Vol. V., Pt. 1.

Essex Institute.—Bulletin, 1884.

Geologists' Association.—Proceedings, 1885.

Greenwich Magnetical and Meteorological Observations, 1883.—From the Astronomer Royal.

Hourly Readings, 1882-3.—From the Meteorological Office.

Institution of Mechanical Engineers.—Proceedings, 1885.—Lincoln Meeting, 1885.—Index, 1874-1884.

Imperial Society of Naturalists of Moscow.—Bulletin, 1884.

Literary and Philosophic Society of Liverpool, Vol. XXXVIII.—1883-4.

Liverpool Polytechnic Society.—Journal.

Meteorological Observations at Stations of the Second Order, for the year 1880.—From the Meteorological Office.

Meteorological Record for 1881-85.—From the Royal Meteorological Society

Monthly Weather Report of the Meteorological Office.—1884-85.

Manufacture of Soda Nitrate.—By R. Harvey.—From the Author.

Mining Association and Institute of Cornwall.—Transactions, 1885.

Manchester Literary and Philosophical Society.—Proceedings, 1883-85.- Memoirs, Vol. VIII.

North of England Institute of Mining and Mechanical Engineers. —Transactions, Vol. XXXIV., Parts 1 to 6.

North of England Institute of Mining and Mechanical Engineers. An account of the strata of Northumberland and Durham, as proved by sinkings and borings.—F. to K.

Notes on Slips connected with Devonshire, Pt. 8.—By W. Pengelly, F.R.S., F.G.S.—From the Author.

Notes on Notices of the Geology and Palæontology of Devonshire, do., do.

Observations and Researches made at the Hongkong Observatory in 1884.

On a Flint Implement found on Torre Abbey Sands, in 1883.—By W. Pengelly, F.R.S., F.G.S.—From the Author.

Penzance Natural History Society.—Report and Transactions, 1884-85.

Philosophical Society of Glasgow.—Proceedings, 1884-85.

Photographic Society of Great Britain.—Transactions, 1885.

Plymouth Institution, and Devon and Cornwall Natural History Society.—Vol. IX., Pt. 1, 1884-85.

Principles of Forecasting by means of Weather Charts.—By Hon. Ralph Abercromby.—From the Meteorological Office.

Prince's Worthies of Devon, and the Dictionary of National Biography, Pt. 1.—By W. Pengelly, F.R.S., F.G.S.—From the Author.

Quarterly Weather Reports of the Meteorological Office.—1877.

Royal Institution of Great Britain.—Proceedings, Vol. II., Pt. 2.

Royal Institution of Cornwall.—Journal, Vol. VIII., Pt. 3.

Royal Geological Society of Cornwall.—Vol. X., Pt. 7.

Royal Geological Society of Ireland.—Journal, Vol. VI., Pt. 3.

Royal Irish Academy.—Proceedings, 1885.—Transactions, Vol. XXVIII.

Royal Scottish Society of Arts.—Transactions, Vol. II., Pt. 2.

Robert Boyle.—A Biographical Sketch.—By Lawrence Saunders. From Messrs. Boyle and Sons.

Society of Arts.—Journal, 1885.

Smithsonian Report.—1883.

Smithsonian Contributions to Knowledge, Vols. XXIV.-XXV.

United States Geological Survey.
  Monographs—4. Comstock Mining and Miners.
  „ 6. Older Mesozoic Flora of Virginia.
  „ 7. Silver-Lead deposits of Eureka.
  „ 8. Palæontology of the Eureka District.
  Bulletins, Nos. 2 to 6.
  Annual Report, 1882-3.

Annual General Meeting.

The Fifty-Third Annual General Meeting of the Royal Cornwall Polytechnic Society was held at the Polytechnic Hall, Falmouth, on Monday, February 8th, 1886, Mr. Wilson Lloyd Fox, F.R.Met.Soc., one of the Vice-Presidents, in the chair. Amongst those present were Mr. Harry Tilly, Vice-President, Rev. Wm. Rogers, M.A., Lieut.-Col. Tremayne, Messrs. Robert Fox, Howard Fox, N. Sara, George Hy. Fox, W. Naylor Carne, D. T. Savary, A. Willmore, Charles Phillips, S. Bennetts, and E. Kitto, Secretary. The ladies present included Mrs. Tweedy, Mrs. W. P. Dymond, Mrs. Clift, Miss Fox, Miss Dash, and Miss A. Francis.

Letters apologising for non-attendance were read from the President, the Earl of Mount Edgcumbe, Dr. C. Le Neve Foster, F.G.S., and Mr. W. M. Grylls.

The Secretary (Mr. E. Kitto) read the minutes of the last Annual General Meeting, which were confirmed, and signed by the Chairman.

The Report of the General Committee for the year 1885 was read. On the motion of the CHAIRMAN, seconded by Mr. N. SARA, the Report was adopted.

On rising to propose a vote of thanks to the retiring President, Mr. ROBERT FOX spoke of the great services which Lord Mount Edgcumbe had rendered, and expressed a hope that the Society would always continue to receive his Lordship's assistance and interest. The following resolution was then proposed by Mr. Robert Fox—"That the Royal Cornwall Polytechnic Society, in annual meeting assembled, desires to express its cordial thanks to the Right Hon. the Earl of Mount Edgcumbe, for the valuable services he has rendered during the three years he has been its President, in attending every year to open the Exhibition, and in connection with the Falmouth Observatory; as well as for the kind manner in which his Lordship has always met the wishes of the Committee in regard to the general interests of the Society; and whilst regretting that his term of office has now come to a close, they feel that his Presidency has been of the greatest value to the Society."

The resolution was seconded by Lieut.-Col. TREMAYNE—who spoke in highly eulogistic terms of his Lordship—and carried unanimously.

On the proposition of Mr. ROBERT FOX, seconded by Mr. A. WILLMORE, the following were elected Vice-Presidents:—The Earl of Mount Edgcumbe, Mr. Robert Bayly, Mr. E. E. Dymond, F.R.Met.Soc., and Mr. D. J. Jenkins, M.P.

The SECRETARY read the Statement of Accounts.

On the motion of the CHAIRMAN, seconded by Mr. GEORGE H. FOX, the accounts were adopted, and the name of Mr. D. T. Savary added to the Finance Committee in the place of Mr. J. P. Bennetts, deceased.

The Statement of Accounts of the Observatory Committee to the 31st December, 1885, was read and adopted. It was proposed by Mr. D. T. SAVARY, seconded by Mr. GEORGE H. FOX, and resolved—"That the best thanks of this Meeting be given to the Building Committee of the Observatory, for the very able manner in which they have conducted their arduous duties throughout the last two years." Mr. TILLY, the Chairman, in acknowledging the compliment, spoke of the small amount of the extras, which was a very satisfactory feature.

Mr. W. L. FOX submitted the Report of the Meteorological

Committee, which, on the motion of Mr. W. N. Carne, seconded by Mr. S. Bennetts, was adopted.

The Secretary read the Report of the Art Union of Cornwall and Statement of Accounts for 1885, which were adopted; and the thanks of the Society were accorded to Mr. W. W. J. Sharpe, for his kindness in continuing to carry out the duties of Hon. Secretary to the Art Union.

It was proposed by Mr. Howard Fox, seconded by Mr. A. Willmore, and unanimously resolved—"That the best thanks of the Society be given to Mrs. Philp, for her great kindness in contributing to the late Exhibition thirty splendid drawings by her late husband, and for personally superintending the hanging of the eighty pictures comprising the "In Memoriam" collection of works by that artist; as well as for the accommodation afforded in allowing the rain gauges to remain in her garden for so many years, and giving the Observatory staff access thereto daily for the purpose of measuring the rainfall."

On the motion of the Chairman, seconded by Mr. D. T. Savary, the thanks of the Society were given to all those who lent pictures to the late Exhibition; the "Hanging" Committee of the Fine Art Section; the Judges in the various departments; those who gave Lectures at the Exhibition; to Mr. C. W. Robinson and those ladies and gentlemen who assisted him in giving an evening concert during the Exhibition, and to the donors of books, &c., to the Library.

The names of Mr. Henry M. Jeffery, M.A., F.R.S., Mr. D. T. Savary, and Mr. B. J. Diplock were added to the General Committee.

Messrs. Robert Fox, H. Tilly, and Wilson L. Fox were appointed a Committee to effect the purchase and conveyance of the Savings Bank premises, including the loan of purchase money; also to attend to the sanitary arrangements of the Polytechnic Hall, the strengthening of the supports of the end gallery, &c.

It was proposed by the CHAIRMAN, seconded by Rev. WM. ROGERS, M.A., and resolved—"That Mr. Howard Fox and Mr. F. J. Bowles be appointed a Committee, with power to add to their number, to arrange for making the manufactures and industries of Cornwall and Devon a special feature of the next Annual Exhibition, and to invite the co-operation of Mr. R. N. Worth and other Devonshire gentlemen, with power to incur all necessary working expenses." Mr. Howard Fox kindly undertook to act as Honorary Secretary to that Committee.

On the motion of Mr. HOWARD FOX, seconded by Mr. A. WILLMORE, it was resolved—"That the General Committee be authorised to appoint a Committee, with power to add to their number, to arrange and carry out a Chrysanthemum Show and other attractions, in the Polytechnic Hall, for the benefit of the Observatory Fund, in November next, with power to incur all necessary working expenses."

Col. TREMAYNE proposed a vote of thanks to the Chairman for presiding that day, and, in so doing, spoke of the valuable services which, not only the Chairman, but numerous members of his family in the past and at the present had and were rendering the Society.

The Rev. WM. ROGERS seconded the vote of thanks, which was carried unanimously, and the Meeting terminated.

Report of the General Committee for the Year 1885.

Your Committee have pleasure to present to you, in General Meeting assembled, their Fifty-third Annual Report. During the past year their careful attention has been given to the general work of the Society, which they have endeavoured to carry out with efficiency. The Annual Exhibition held in the month of September was thoroughly representative. Every department maintained its standard of quality, whilst the exhibits were quite equal in number to those of former years.

The Mechanical Department was of a very varied character, and in every section included articles of great merit and usefulness. There were many good models of mining and other machinery, illustrating important inventions and improvements, as well as mechanical inventions of domestic, sanitary, and general utility. Perhaps the best model in point of workmanship, exact detail, and highest finish, was that of a pair of Oscillating Marine Engines, as constructed for the Holyhead Mail-boats, sent by Messrs. Watt and Co., of Birmingham, and made by two of their workmen. To this firm the Society was also indebted for the loan of a singularly interesting set of drawings of Cornish Mine Engines and other Machinery, dating from 1777, by James Watt, the great engineer; an engraving of whose head from the bust of that distinguished philosopher, by Chantrey, has always been the form of medal given to successful competitors at our Exhibitions.

Mention should be made of the Magnetic Ore Separator of Mr. F. J. King, of London, and Ashton's New Steam-power Meter and Indicator, shown by Messrs. Ernest Scott and Co., of Newcastle-on-Tyne, both of which received the highest awards at the hands of the Judges.

Several valuable essays were received, some of which were publicly read—that on "the Life History of the Pollock," by Mr. M. Dunn; and one on "the Storage and Transmission of Tidal Energy," by Mr. J. Q. Dunstan; will be printed in the Annual Report.

There were several meritorious exhibits in Naval Architecture, chief among which was the beautiful Cruising Canoe, with self-reefing sails and other improvements, sent by Mr. R. J. Turk, of Kingston-on-Thames, and which occupied a prominent position in the centre of the Hall.

In Fine Arts the pictures sent by professional artists were rather fewer than on some former occasions; any falling-off in this respect was however more than compensated by the magnificent collection of paintings by the late J. G. Philp.

The efforts made to bring together a representative collection of this deceased artist's pictures were rewarded with really grand results, due mainly to the kind manner in which Mrs. Philp met the wishes of your Committee, by generously lending about thirty works, showing his splendid talent in all its aspects, and comprising many of the finest specimens of his genius. These were supplemented by the loan of fifty other examples from various local friends, which altogether formed the finest series of the deceased artist's works ever brought together. So far back as 1838 Mr. Philp won the first silver medal of the Society, and among the 80 drawings comprising the "In Memoriam" collection, which occupied the place of honour in the gallery, were representative examples of his work during his entire career as an artist.

Your thanks are due to all those who contributed to this portion of the Fine Art section, but especially to Mrs. Philp, who not only lent such a large proportion of the pictures, but, assisted by Mr. R. H. Carter, personally superintended the hanging of the whole.

The Amateur work was quite up to the average, several students showing such advancement as should ultimately place them in a successful position.

Ornamental Art was well represented.

Special mention should be made of the Royal Barum Ware sent by Mr. C. H. Brannam, of the Barnstaple Potteries, many of the specimens showing the highest artistic feeling and technical skill.

The Photography was as usual of excellent order in both its sections. The most noteworthy picture in the professional class was a grand composition of poetic conception, and worked out with the highest artistic skill, entitled "Dawn and Sunset," from the studio of Mr. H. P. Robinson, of Tunbridge Wells.

Amongst Photographic Appliances prominence must be given to Eastman's Dry Plate Film Roller Slide and Apparatus, in which a paper film supersedes the use of the ordinary glass negative. This discovery is, perhaps, the most valuable of recent times in Photographic Art, and bids fair to open a new era in its development.

Natural History comprised a fairly representative collection of articles, whilst the remaining departments call for no special notice.

The Exhibition was opened by your President, the Earl of Mount Edgcumbe, in the presence of a large and influential assembly, and there was quite an average attendance throughout the week. Your thanks are due to Mr. J. H. Collins, F.G.S., and Mr. Howard Fox, who gave lectures during the Exhibition, and to Mr. C. W. Robinson, who arranged and conducted an attractive evening concert.

The Drawing for Prizes in the Art Union took place in the Hall on the evening of September 25th, under the presidency of Mr. E. D. Anderton. The importance of the Art Union as a means of encouraging artists to contribute their works to the gallery, and as the chief medium through which sales are effected cannot be overrated, and the Society is to be congratulated on retaining the efficient services of Mr. W. W. J. Sharpe as Hon. Secretary, to whose exertions the continued success of the Art Union is mainly due. Mr. Sharpe is deserving of your thanks.

The Annual Meetings of the Miners' Association of Cornwall and Devon, formerly held at the Polytechnic Hall in conjunction with your Exhibition, are discontinued. That Association has been amalgamated with the Mining Institute of Cornwall, and the rules of the Amalgamated Society prescribe that the Annual Meetings shall be held early in the year. The Exhibition was however visited by a large number of members of the Mining Association and Institute of Cornwall, and their Science and Art Classes also made it the centre of their Annual Excursion.

Your Committee reported last year that arrangements had been made for the purchase of the Falmouth Savings Bank premises in front of the Hall.

These premises have not yet been vacated by the Savings' Bank authorities, but the property will in all probability be in possession of this Society in a few months. Through the courtesy of Mr. Pollard, the Secretary of the Savings Bank, and an arrangement with the Church Institute as tenants, their large Committee Room was placed at your service for the purposes of the late Exhibition.

A list of presents to the Library during the year is laid before you.

Your Committee are happy to state that the New Observatory Building—which at the last Annual Meeting was reported as progressing steadily—was duly completed, and the various instruments transferred from the old Observatory, fixed in position, and started at work in the new buildings by the beginning of May last.

The Observatory Committee have reported that they thoroughly examined the detailed accounts furnished by the Building Committee for the whole of the work executed by the Contractors, Messrs. Olver and Sons, with whom everything has been settled in the most amicable way.

A statement of receipts and expenditure of the Observatory Fund to the 31st December, 1885, is submitted herewith. Your Committee would state that the extras include the finishing of the N.E. and S.E. upper rooms, the pointing of the N. and E. fronts of the building, an extension of the sanitary arrangements, and other items which were not anticipated when the original specification was drawn, but which were found to be necessary, and the whole of which have been completed for an outlay of £33 7s. 9d.

An account for the expenses of removing and refixing the various instruments, &c., amounting to £43 6s. 3d., was sent to the Meteorological Office on the 5th December, and was promptly settled by the Council.

All liabilities on the new Observatory buildings and premises have been paid, in accordance with powers conferred upon the Observatory Committee at the Annual Meeting held on February 14th, 1884.

The Observatory Committee have furnished a Report, which will be printed in extenso in the Annual Report, and from a reference to it may be gathered full information on all points in connection with that subject.

It will be remembered that at the Society's Exhibition in September last, when your President, the Right Hon. the Earl of Mount Edgcumbe, formally declared the Observatory open, he announced that Mr. G. H. Fox had offered to give £10 (second donation) to the Observatory Fund, provided that £100 should be raised during the year 1885, and that Mr. Fox's offer had been handsomely supplemented by Miss Fox, of Penjerrick. His Lordship, on behalf of the Society, invited further contributions, and your Committee have pleasure to report a total addition to the fund by donations for the year 1885 of £117 17s. as follows:

Miss Fox....................	£25	0	0	*(Second Donation).*
Mr. Robert Bayly.........	20	0	0	
„ John Bayly	10	0	0	
„ Geo. Henry Fox......	10	0	0	*ditto.*
„ Robert Fox	10	0	0	*ditto.*
„ R. B. Brett............	10	0	0	
„ F. Walters Bond	5	5	0	
Earl Kimberley, K.G. ...	5	0	0	*ditto.*
Mrs. A. L. Fox	5	0	0	
„ R. F. Sturge	5	0	0	
Mr. Fras. Bassett........	5	0	0	*ditto.*
„ H. M. Jeffery, F.R.S.	2	10	0	*ditto.*
Rev. Sir Vyell Vyvyan, Bart.....................	2	0	0	*ditto.*
Dr. Mason Pooley	1	1	0	
Mr. P. D. Tuckett	1	1	0	
„ D. T. Savary	1	0	0	

A debt of about £500 still remains on the building, which your Committee are anxious shall be speedily liquidated. They are now carrying through a series of lectures and entertainments at the Polytechnic Hall during the winter months on behalf of the funds, and also propose holding a Chrysanthemum Show in the Polytechnic Hall, next November, in aid of the same object. It is hoped that these efforts will be further supplemented by donations from friends of the Polytechnic Society, who have the interests of the Observatory at heart.

Your grateful thanks are due to the Observatory Committee for the manner in which they have carried out the duties imposed upon them since their appointment in April, 1883, in connection with the retention of the Falmouth Observatory, the erection of the New Buildings, and the procuring of funds for that purpose, together with the great amount of general work which these combined objects have involved. Special thanks are also due to their Building Committee, who have paid such constant personal attention to every detail, and have brought the whole of the work to a satisfactory completion with due regard to economy, having expended on the buildings only a trifling sum over and above the amount of the original contract.

Mr. W. M. Harrison, Photographic Artist, of Church Street, Falmouth, has kindly offered to make a present to the Society of 400 Cabinet Photographs of the Observatory, which it is proposed shall form a frontispiece for the Annual Report for 1885, now in the press.

Whilst your Committee thus record the services in various forms which so many friends of the Society have rendered, they are painfully reminded that some of those who hitherto afforded signal help have, during the past year, been taken away. The first to be removed from our midst was Mr. J. G. Philp, whose connection with this Society dates back to its very foundation, he having won a prize for a marine view of Pendennis at the Society's first Exhibition in 1833. From the encouragement then given him to cultivate artistic taste Mr. Philp steadily progressed in his studies, and afterwards adopted Art as his profession. As an artist he gained for himself an extended reputation, and was a member of the Council of the Royal Institute of Water-colour Painters. As a Falmouth man he took great interest in the Polytechnic Society, as a member of the General Committee, chairman of the Hanging Committee, and a Judge of the Fine Arts, which department of the Exhibition he did so much to adorn by constant contributions of his works. His loss will long be felt.

On the 23rd June another worker, in the person of Mr. Alfred Lloyd Fox, was called to rest. As a member of that family to whom the Polytechnic Society owes its existence, and to whose labours and influence its present position is mainly due, he did much to assist in carrying on its work. He was Honorary Secretary of the Society from 1866 to 1870, and on relinquishing the duties was presented with a suitably bound copy of "The Universe," in recognition of his services. He was also a Member of the General Committee, and one of the Judges in Natural History, in which department of the Exhibitions he frequently offered special premiums, with a view to encourage in young students of nature a spirit of investigation and enquiry.

Later in the year came the death of Mr. J. P. Bennetts, whose varied services to the Society it was your pleasure to recognise and acknowledge by a special resolution at your Annual Meeting last year. His loss will be severely felt by your Committee, at whose meetings his sound judgment and great business tact were much valued.

Several new members have been enrolled during the past year, and it is hoped that further additions will be made to the list of Annual Subscribers.

The financial position of the Society continues to be satisfactory; the Statement of Accounts now laid before you shows an increased credit balance of over £50.

Your President, the Right Hon. the Earl of Mount Edgcumbe, retires this day, having held office for three years, the term prescribed by rule, and is not eligible for re-election. During that time his Lordship has rendered valuable service in attending every year to open the Exhibition, and has also shown great interest in the Observatory. His first official act as President was to attend as Chairman of the Deputation which waited on the Meteorological Council in London on the 23rd June, 1883, when, with others, he urged upon the Council the desirability of retaining the Observatory at Falmouth. Again, on the 12th of August, 1884, after attending at great personal inconvenience to open the Polytechnic Exhibition, his Lordship kindly undertook publicly to lay the Foundation Stone of the New Observatory, and gave a generous donation to the building fund.

You will doubtless to-day give expression to your appreciation of the many services which your retiring President has rendered during his term of office; and your Committee suggest that you leave the appointment of his successor in their hands.

Four of the Vice-Presidents retire this day by rotation, viz., Rev. Canon Rogers, M.A., Right Hon. Lord Robartes, Sir Joseph W. Pease, Bart., M.P., and Mr. Harry Tilly, and you are asked to elect four others to fill their places. The names of the Right Hon. the Earl of Mount Edgcumbe, Mr. Robert Bayly, Mr. E. E. Dymond, and Mr. D. J. Jenkins, M.P., are recommended.

Report of the Meteorological Committee for the Year 1885

Your Committee beg to report that your Hon. Secretary visited London in February last, and, in conference with Mr. Whipple, at the Kew Observatory, went fully into the expense of the proposed new Magnetographs, their accommodation, and erection, &c., when it was found that if the necessary Absolute Instruments were procured the grant of £300 would be deficient by a sum of about £100. After consultation with Prof. W. Grylls Adams and Prof. G. Gabriel Stokes, it was decided that your Hon. Sec. should write formally to the Royal Society, and apply for an additional grant of £100, to cover the cost of a Dip Circle and a Unifilar, unless that Society preferred that they should be borrowed from the Kew Committee, in case they were able and willing to lend them. Application was accordingly made, and on the 27th of June a communication was received from Prof. M. Foster, stating that the Royal Society had, upon the recommendation of the Government Grant Committee, placed a grant of £100 at the disposal of the Polytechnic Society, for the purpose of purchasing the above-mentioned instruments. A letter was also written to the Kew Committee in March, asking them to be good enough to undertake the supplying of a set of verified Magnetographs, their erection at Falmouth, and the necessary instruction in their management to your Observatory Superintendent, which they kindly consented to do. These instruments are being made by Mr. R. W. Munro, of London, from plans and specifications prepared by Mr. Whipple, who has been of great service to your Committee by his advice and assistance in making the preliminary arrangements. They are simpler in construction and less expensive than those in use at Kew and elsewhere, in order that the Royal Society's grant may be sufficient for the purpose for which it was intended. In August last, when the abovementioned grant of £100 was paid, the Kew Committee were requested to supply the Absolute Instruments which they have now under examination at Kew. The sum of £80 has been paid to the Polytechnic Society for the accommodation provided in the New Observatory for the Magnetographs, and the building of the Absolute Magnetic House will shortly be commenced.

The Observatory Committee have fully reported on the arduous and excellent work which has been accomplished in the completion of the New Observatory, and the safe removal of the instruments (which your Committee are pleased to be able to report are now in good working order), so that they refrain going over any of the same ground in this Report.

The copper rain-gauge in Mrs. Philp's garden remained there until the end of the year, when it was removed, with the consent of Mr. R. H. Scott. Daily records were taken therefrom, in addition to those at the Observatory, from the beginning of May until the end of December, with a view of comparing the returns of the two stations. This has been done, and it is found that during the above-mentioned period the Woodlane gauge registered 1½ inches more than the similar gauge on the new site. From this comparison it may be concluded that the position of the Woodlane gauge has been satisfactory, and that during the last sixteen years it has not given an insufficient record of the annual rainfall. The warm thanks of your Society are due to Mrs. Philp for having very considerately allowed the rain gauges to remain in her garden so many years, and for thus, in the interests of science, affording an accommodation which has been of much value, and which it would have been most inconvenient not to have had.

Your Committee have sustained a great loss in the lamented death of Mr. J. P. Bennetts, and they would propose that Mr. Henry M. Jeffery, M.A., F.R.S., be appointed to fill up the vacancy.

On the 31st of December the Thermometers, which have been read daily by your Hon. Sec., at his residence (Carmino), were, with the Stevenson screen, in which they are hung, removed to the Observatory grounds and placed over grass in a thoroughly exposed position. The Observatory staff will in future take the observations, and will make out the monthly returns and forward them as heretofore to the Royal Meteorological Society for publication with the data obtained from their other climatological stations. It will be interesting to compare the results obtained in this screen (well exposed as it is on all sides) with those obtained from the adjoining Observatory Thermometers, which are necessarily protected on one side by the Observatory wall, and on the other three sides are enclosed in a screen of very much larger dimensions than the Stevenson screen.

Owing to the illness of Mr. Gill, and to other causes, the observations at the Helston station have unfortunately not been regularly maintained during the past year, and no table can therefore be published with those which will be prepared by Mr. Kitto and your Hon. Sec., and published in the Annual Report as usual.

WILSON LLOYD FOX,
HON. SECRETARY.

THE FIFTY-THIRD EXHIBITION

Of the Royal Cornwall Polytechnic Society opened on Tuesday, September 22nd, 1885, and proved exceptionally attractive, interesting, and useful. The whole of the exhibits were concentrated at the Hall, the capacities of which were, therefore, taxed to the very uttermost, and which had never presented a more effective appearance. The body of the building was, as usual, appropriated to the Mechanical and allied sections, and the gallery to the Fine Arts, the special feature of which was the magnificent loan collection of the works of the lamented Cornish artist and long-tried friend of this Society, Mr. J. G. Philp. The Photographs were, as usual, arranged in the large Committee Room upstairs; Lace and Needlework in the Library; and, for the first time, special accommodation was provided for the Natural History collection, which filled the Reading-room.

INAUGURAL PROCEEDINGS.

The Exhibition was formally inaugurated at one o'clock by the President, the Right Hon. the Earl of Mount Edgcumbe, who was accompanied by Lady Ernestine Edgcumbe. The attendance of members and friends was exceptionally large and influential, the company including Sir John St. Aubyn, M.P., and Lady Elizabeth St. Aubyn, Lady Pease, Col. Maurice, R.E., and Mrs. Maurice, Miss Fox, Miss Sterling, Miss Boucher, Col. Tremayne and Mrs. Tremayne, Mrs. Michael Williams (Caerhays), Mr. E. Beauchamp-Beauchamp, Mr. Davies Gilbert, General Aylmer, Mr. E. S. Carus-Wilson, Mr. R. Carter (Mayor of Falmouth), Rev. B. Christopherson (Rector of Falmouth) and Mrs. Christopherson, Mr. George Williams, Mrs. J. Bolitho, Mrs. Rogers, Miss Stuart Wortley, Miss Lanyon, Miss Fane, Miss White, Miss Nunn, Dr. Jago, F.R.S., Major Pender, Major Parkyn, Dr. Harris, Capt.

Rogers, R.A., Lieut. St. Aubyn, Commander Thornton, R.N., Lieut. Reed, R.N., Revs. Canon Rogers, Canon Tyacke, Molesworth St. Aubyn, C. W. Carlyon, W. Rogers, G. T. Bull, F. R. Hole. Messrs. Robert Fox, W. L. Fox, Howard Fox, H. Tilly, J. S. Perry, T. Webber, W. Brooks, W. N. Carne, W. M. Grylls, F. J. Bowles, T. H. Tilly, Piers St. Aubyn, M. H. Williams, R. N. Worth, F.G.S. (Curator), E. Kitto, F.R.Met.S. (Secretary), W. H. Christoe, T. R. Olver, G. T. Olver, A. Olver, John Stephens, J. H. Collins, F.G.S., G. H. Fox, J. K. Kinsman, W. Trethowan, E. D. Anderson, F. W. Michell, F. W. Newman, S. Bennett, G. Ficklin, F. M. Harris, W. J. Genn, N. Sara, P. Colville Smith, H. S. Mackenzie, R. Gloyn, H. Pollard, G. C. Fox, F. W. Fox, S. M. Fox, A. F. Fox, Herman U. Broad, and Francis Bassett.

The EARL OF MOUNT EDGCUMBE, in his opening remarks, said it had given him much pleasure to find himself able for the third time during his tenure of office as president, to inaugurate the annual exhibition of the Society. Some people thought that a formal address on the part of the president was a *sine qua non* upon such an occasion. He hoped others would agree with him in thinking that the custom was sometimes "more honoured in the breach than in the observance." He felt that they would be better employed in looking at the exhibits, than in listening to any such vague generalities upon the advancement of science and art as he could offer them. Any remarks he could make upon the exhibits were also discounted by the very copious accounts and minute descriptions which had appeared in the daily newspapers. The Polytechnic Society, which was now in its fifty-third year, had held its own well, and still continued to deserve fully the name it bore, by the variety and number of the exhibits within its walls. (Applause). Of course, in a county like Cornwall, whose chief industry had maintained its struggling existence chiefly by the adaptation of mechanical and scientific ingenuity to the necessities of its condition, it was natural that there should be a good many interesting examples of mechanical contrivances connected with mining. He could scarcely venture to speak of any in particular; but there was a very ingenious self-acting skip, which emptied itself on coming to surface. (Hear.) Mr. King's magnetic ore separator also struck him as being an excellent invention; and the steam-power meter of Mr. Ashton he likewise thought extremely ingenious. It would practically register the work of an engine, for example, in a ship going round the world. The Polytechnic Exhibition brought mechanical contrivances together, not only from the locality, but from a distance. There were mechanical inventions of domestic, sanitary, and general utility, interesting to every householder, and ranging from the parlour to the kitchen. There was, for example, a contrivance to enable doors to shut without the slightest noise. There was also a little machine which would prepare as many potatoes for cooking in two minutes as the most industrious kitchenmaid could prepare in twenty minutes, and that without wasting the peelings, which had been the pig's perquisite ever since the time of Queen Elizabeth. (Laughter.) He should like to mention also a simple contrivance made by an inventor from his immediate neighbourhood, which might otherwise pass unnoticed. It was a window sash, so contrived that anyone could take it out without recourse to a carpenter. (Applause.)

The Exhibition, as usual, embraced a large number of works of art. It would be most invidious for anyone who had been so short a time in the hall as he had been to particularise, but there were two series, one in the Fine Art and one in the Mechanical Department, which must be interesting to everyone, and which were most encouraging to those who had any grounds for making either science or art their profession, because they were the record of the progress of two men who, starting in humble life, reached a high position in their professions. He alluded, in the first place, to the drawings of that Glasgow lad, who, by perseverance and ingenuity, acquired a name which would last so long as the steam engine was used. (Applause.) He referred, of course, to James Watt, who had much to do with Cornwall, and whose bust was upon the medal of their Society. (Applause.) In that Exhibition there was a collection of Watt's plans and designs and drawings of engines, which shewed that he was not only a genius, but was most careful in everything he did. (Applause.) Then, again, no visitor would fail to be struck by the large collection of pictures, by one who started in that town in as humble a position as did Watt in Glasgow. Mr. J. G. Philp began as a painter's apprentice, and in the collection of his pictures now in the gallery they would see the gradual development of his genius, from its earliest indications to the magnificent works which were hung in the centre of the series. (Applause.) The Barum ware in the Ornamental Art Department, and the bee appliances, were also very noteworthy in their way, and he could not speak too highly of the Photographic collection. (Applause.) One thing which he had not seen before was the paper which had been applied for the use of negatives. That really seemed to him to be going back to the old paper negatives, which he remembered his uncle, Mr. Talbot, making experiments with, long before the photographic art was given to the public at all. (Applause.)

In the next place he had the great pleasure of declaring the Falmouth Observatory formally opened. The foundation stone was laid by himself on the 12th of August last year, and the building was completed on the 1st of May, and handed over to the Committee, and was now in full working order. The total cost was about £1,300, and of that sum about £680 had been received, and £620 was left to be raised. Mr. G. H. Fox was anxious that £100, at any rate, should be got that year, and had promised £10 if it was forthcoming. (Applause.) Miss Anna Maria Fox had given £25 towards it, and anybody who liked was welcomed to help to complete it.

His lordship concluded by declaring the Exhibition open, and reminding those present that his duties as their triennial president were, with the performance of that task, closed.

Sir John St. Aubyn, Bart., M.P., moved a cordial vote of thanks to the Earl of Mount Edgcumbe for his address, and for the manner in which his lordship had carried out his duties as president. At the commencement of his remarks, the noble earl, with his usual modesty, had said he would not detain them by entering into a detailed description of the beautiful and useful objects around them. But he felt that, unwittingly, their President had done the Society some little pecuniary damage by his after remarks, inasmuch as he had gone so instructively into the merits of many of the exhibits that the audience would feel they could on that occasion dispense with a catalogue altogether. (Laughter.) Lord Mount Edgcumbe had referred to the fact that that was his last year of office, and he (Sir John) was sure that the pleasure with which they had listened to the noble president's address was tempered somewhat by regret when they felt that it was the last they would hear from him in that capacity, at least for some time. (Hear, hear.) He had known many presidents of the Polytechnic Society, but the Earl of Mount Edgcumbe had attended to the duties of the office with so much attention and assiduity, that it certainly could not be said he had ever been surpassed by any of his predecessors. (Hear, hear.) They could, therefore, derive the consolation that, from what his lordship had done, he had offered an example to his successors that they would do well to follow. He regretted very much that, according to the rules of the Society, the Earl of Mount Edgcumbe could not succeed himself as president. (Hear, hear, and laughter.) But while that was the case, they hoped at no very distant period to have the advantage and honour of again seeing the Earl of Mount Edgcumbe among them in that capacity. (Applause.)

Col. Maurice, R.E., seconded the vote of thanks. Inasmuch as he had only arrived within the last few days in Falmouth, he could not be expected to express the feelings of the people of Falmouth with respect to the motion before the meeting, and that being so, he stood before them as representing the gratitude which all the rest of the world felt towards their retiring president. (Laughter.) Very great thanks were due to the Earl of Mount Edgcumbe for carrying out so ably the duties of president of a Society which was the parent of all similar institutions in the county, which had been so long connected with names now and long familiar to all England, and which had brought Falmouth within the affectionate knowledge of many of the people of the kingdom at large. (Applause.)

The motion was carried with acclamation, and the proceedings terminated.

Judges' Reports.

MECHANICS.

SECTION I. ROCK DRILLS, STEAM ENGINES, BOILERS, AND MACHINERY CONNECTED THEREWITH.

SECTION II. SANITARY AND DOMESTIC INVENTIONS AND IMPROVEMENTS.

SECTION III. GENERAL MECHANICS.

JUDGES:—*Mr. Nathaniel Fox, Chairman; Messrs. E. D. Anderton, G. H. Eustice, W. M. Grylls, F. M. Harris, J. Hosking, F. W. Michell, C.E., H. S. Mackenzie, W. Slade Olver, J. Poole, W. Sisson, M.I.M.E., N. Sara, and J. Stephens.*

The Judges of Mechanics congratulate the Society upon the extent and variety of the exhibits. Every section is fairly represented, and several exhibits are of exceptional interest and value, and of much importance in connection with the industries of the county. £1 is awarded for workmanship to a model of a marine expansion engine by J. Jobson, and 10s. for a model of a horizontal engine by a youth named W. Francis. D. Low's case of engineer's tools is commended for beautiful workmanship. He has already had a medal for a like exhibit. A first bronze medal is given to Messrs. R. and J. Beck for the combined excellence and economy of their new "Star" microscopes. Davey, Sleep, and Co. have a similar award for their equalising whippletrees. Of the three belt-fasteners shewn, the judges do not make any choice. W. G. Edmonds's patent universal joint is a highly ingenious arrangement. A first bronze medal is given to Messrs. Amos and Hunt, for their excellent device, applying the ensilage principle to stacks by means of pressure from chains and levers. Messrs. A. and H. Williams exhibit a hydraulic ram, three-throw pumps, and a duplex turbine wheel with self-governing gear, to which the Judges would call special attention. W. Brenton's "Preston" whippletree is commended for its practical utility and cheapness. Messrs. F. and C. Hancock's machines for domestic use are highly appreciated, as being useful and economical devices. The potato washer has a first bronze medal, and that for washing butter a second. J. B. Jordan's excellent photographic sunshine recorder has a second silver medal. E. H. Clark's aerated flower pots are recommended for trial. C. A. Hosking has 10s. for amateur workmanship. S. G. Bennett receives a first bronze medal for his hydraulic hoist. J. D. Dunstan's vibrapult is highly commended for its ingenuity. The side feed lubricator of Messrs. Lindley and Co. has a first bronze medal, and the whole of their array of guages, cocks, and lubricators is commended. Messrs. Gibbs and Co. also make an excellent display. They have a first bronze medal for their tube beader, and a second for Bauer's pipe vice, while Bauer's spanner is commended. To a very noteworthy exhibit, the Brockelbank railway coupling, a second silver medal is awarded. Kinnear's self-lighting gas burner and governor has a second bronze medal. A like award is made to R. W. Tayler's road-sweeping machine. Kitto, Paul, and Nancarrow's automatic discharging and righting skip and wagon is a very useful arrangement, and has a first bronze medal for the automatic discharge. Stephen A. Phillips's "Cerus" traps have a first bronze medal, specially applicable to the grease trap. The "Barrow" an "Climax" drills are shewn with various improvements. F. King's magnetic ore separator does its work most efficiently, a is likely to be of considerable use in the county. It has a fi silver medal. To Messrs. Olrick's wire flooring for drying purposes a first bronze medal is given. John Johnson makes an excellent show of perambulators. His walking-stick chair is very simple and handy. T. B. Bethell's "unique" boxes for parcels post, &c., are most ingenious and useful. J. L. Spoor's cement testing machine is an excellent arrangement, and has a second silver medal. An award of ten shillings is given to W. Courtis for his admirable decorative painting in imitation of wood and stone. The makers of the model engines from Messrs. James Watt and Co., have a first bronze medal for workmanship. J. H. Steward's reflecting level and prismatic compass has a first bronze medal. £1 is given to Henry Broad in recognition of the labour given to the model of his pulveriser. The Judges are glad to see the important class of stone-breaking machines represented by a model of the latest and most improved form of Baxter's patent knapping-motion apparatus. An award of 10s. is made to H. Maddern, a youth, for the labour in his cottage plans. Ashton's steam power meter and indicator is regarded as one of the most important inventions ever brought before the Society, and has a first silver medal. A first bronze medal is given to the excellent filters of W. L. Barstow. 5s. is given to T. A. Mannell, a lad, for the ingenuity displayed in the child's gun; but the judges hope he will in future turn his abilities to better account. Carne's improved window sash has a first bronze medal. The judges are very favourably impressed with Tangey's parabolic governor, but would like to have results of trial before giving an award. If it accomplishes as much as is expected it will be worthy of a first medal. The Judges have seen Askham Bros. and Wilson's full-size pulveriser under a practical test, and are of opinion that its simplicity of construction and durability, and the ease with which the wearing parts can be replaced, added to its power of reduction, entitle it to a first silver medal. Hawke's injector auxiliary has been severely tested with most satisfactory results, the injector feeding into the boiler water of 125 degrees temperature, the pressure in boiler being between 40 and 50 lbs. A first bronze medal is awarded.

ESSAYS AND SCIENTIFIC PAPERS.

JUDGES :—*Messrs. J. J. Beringer, F.G.S., R. J. Frecheville, F.G.S., and R. N. Worth, F.G.S.*

The Judges beg to report an unusual number of essays, some of much interest and value. An important paper, "Researches in Agricultural Chemistry," by Dr. A. B. Griffiths, F.R.S.Ed., if available for that purpose, it is recommended should be printed in the Society's Transactions. A first bronze medal is awarded to a practical paper, of high merit, by Mr. J. Q. Dunstan, "On the Storage and Transmission of Tidal Energy." Benjamin King has 20s. for the pains bestowed on his "Essay on Architecture." The essays on subjects of Natural History are dealt with by the Judges in that department.

NAVAL ARCHITECTURE.

JUDGES :—*Mr. H. S. Mackenzie, Mr. W. H. Bisset.*

The Judges of Naval Architecture report that the model of the patent boat-lowering and detaching apparatus, shown by L. E. Liardet, is excellent and perfectly safe under all circumstances, the hooks detaching only when the boat is water-borne. It is awarded a second silver medal. A similar award is made to the cruising canoe of Richard John Turk. It has centre-board, self-reefing sails, circular rudder yoke, and adjustable backboard and stretchers. It is very handy in every particular for the special purposes such craft are built for. The same exhibitor is awarded a first bronze medal for radix patent folding centre-board, very compact and perfectly adapted to its requirements; and is commended for a newly-invented rudder with centre-board, not new in principle but in design and material. Copeland and Lacey have a second silver medal for a patent improved line-throwing apparatus, for establishing communication between two vessels or the shore from on board, with adjustable claw for attaching to vessel's rail. This apparatus was much needed, and is thoroughly practical. A model to scale is commended. A first bronze medal is awarded to T. G. Tagg and Son for a novel and useful patent seam for the decks and cabin tops of yachts, &c.; and a like medal to A. H. Williams, for a model of a patent seat raft for passenger vessels, which is useful and well adapted to the purposes for which it is constructed. H. Jepson's model of a Viking ship is very interesting, from its antique form and beautiful lines, showing how small is the change made in 10 or 12 centuries in the most suitable section for buoyancy, speed, and stability.

FINE ARTS.

SECTION I. AMATEUR OIL PAINTINGS AND WATER COLOURS.

SECTION II. PENCIL, CRAYON, ENGRAVING AND ETCHING, LITHOGRAPHY, &c.

JUDGE:—*Mr. W. Boase Smith.*

The oil paintings by amateurs present an average show in comparison with former years. Among them is especially noticeable a painting of Cornish children, by Miss Constance Hill. This, however, is debarred by the rule of the Society from receiving the silver medal which it so deservingly merits. The lad's head in this painting is thoroughly well modelled and full of life; but there is a prevalence of brown tones throughout the work. A portrait study by J. Henwood Blamey is very skilful in the handling and general brush work, and it is cleverly drawn. It has been awarded the second silver medal. Mrs. Paul's study of a "Child with an Apple" is highly commended, and if original, would have been awarded a medal for excellency of work. In the landscape department "Quietude," by Radcliffe Hall, is awarded the first silver medal. For gradation of tone, with force, it is simply excellent, but a little varnishing here and there would improve it. "Clovelly," by Thomas R. Parnell, is carefully painted, and is conscientious in the drawing. A second bronze medal is awarded to it. A series of fruits and flowers, by Miss Saunders, deserve mention for the pains taken in drawing, but rather more knowledge is needed in the arrangement and composition of the general work. A second bronze medal is given for the series. As formerly, it is a matter of regret that amateurs do not take up figure subjects and devote their energies to this branch of art.

In water colours, a sketch of a donkey, by Miss C. Westmacott, is an excellent work, and shows great power both in manipulation and in drawing. A first bronze medal has been awarded to it. "Spaniel and Dead Game," by Eddy Brittan, is very good for a lad of 15, and should be specially commended. "Oyster Dredging," by Alfred Thomas, is fairly good, although the figure looks rather too refined for a fisherman. An important work by Miss Maubant is worthy of mention, as showing a very careful observation of nature. A second silver medal is given. "Lane at Trefusis," by Miss T. Hoblyn, shows a thorough appreciation of art, and is full of clever work, with free style of handling and purity of tone. A little more study of breadth of light and shadow would be an improvement. It has the first silver medal. A series of water-colours by George Cook give evidence of careful study; with more attention to the composition and to light and shadow, there would be a decided prospect of improvement. "Chrysanthemums," Mrs. G. H. Fox, is a well-composed drawing, faithful in its character and most carefully painted, and pleasing in the regard for colour. It would have had the first bronze medal, but the rule prohibits this.

"The Little Ones," enlarged from a photograph, in monochrome, by Palmer, is full of power, in giving faithful likeness and true appreciation of effect. The whole work is most carefully done, and a first bronze medal is awarded.

SCULPTURE, ARCHITECTURE, AND ORNAMENTAL ART.

JUDGES:—*Miss A. M. Fox, Mrs. Genn, Mrs. Rogers.*

The Judges in Ornamental Art are glad to report satisfactory progress, especially in the specimens of pottery sent by Mr. Brannan, in which form, colour, and design are very artistic. A first silver medal is given. Two cases of painted china, Misses E. Leggo and S. Thomas, are so good that the Judges have awarded a second silver medal each. Mr. Hems's cover for a font, ornamented in wrought iron—an original design—has a first silver medal. In brass work, by far the best specimen is Miss L. Brown's music-stand, to which a first bronze medal is given. There is a very interesting specimen of wood-carving, a copy of Attorney-General Noy's bust, from an old monument in Buryan Church, by C. A. Howitt, which receives a first bronze medal. Of the screens exhibited, Miss Mary C. Coode's has received a first bronze medal. The second has been awarded to Miss M. G. Borlase for three unmounted, for their boldness and freedom of design; but the Judges are of opinion that the dark colour of the background rather interferes with the delicacy of the flowers. An interesting exhibit of cups and saucers made by a mason, of stone used in Truro Cathedral, shews much ingenuity. The Judges have, therefore, given it a prize, although they think the material too heavy for the purpose to which it has been adapted.

PHOTOGRAPHY.

JUDGES :—*Messrs. R. Fox, W. Naylor Carne, G. Lanyon, and W. Brooks.*

The Judges have great pleasure in congratulating the Society on the high excellence of the Photographic Department—the number and quality of the exhibits being far above the average of past years; and they think it will not be saying too much in stating that, in their opinion, the present display is the finest that it is possible to bring together. The matter of judging has been one of great difficulty, owing to the high character of the work and the general evenness throughout. There are not so many landscapes as last year, but the exhibition is strong in instantaneous specimens, and this class of work is much better. In the Amateur Department several of the amateurs beat the professional workers. Transparencies and lantern slides make a strong feature this year, by both professionals and amateurs. The Photographic Appliance Department is well represented in cameras, instantaneous shutters, etc.; but the greatest feature here is the Eastman Company's roller-slide, which is well worthy of attention, being a new feature in photography, making the photographer's luggage lighter by using paper as a support for the sensitive film instead of glass. There are also several exhibits in the magic-lantern department worthy of attention.

PROFESSIONAL.

H. P. Robinson is again to the front with a very noble example of his work, "Dawn and Sunset," being in the opinion of the Judges the finest picture he has ever produced; the conception is very fine, and the composition well carried out in all its points. This picture has been awarded the first silver medal. The same gentleman has also several other fine examples which deserve attention.

R. W. Robinson has a very good study, "'Twixt Cup and Lip."

W. Gillard, of Gloucester, is represented in a different line; this year he sends some extremely fine examples of transparency work, which are most beautiful in tone, with force, brilliancy, and colour that cannot be surpassed; to this frame has been awarded a first bronze medal. The transparencies are made upon plates prepared by himself, called the pearl plates, which he has placed in the market. By the same process he sends a frame of vignette portraits printed on matt opal, also very rich in colour.

In portraiture, W. W. Winter again receives a first silver medal for his portrait study, "Undecided," which is very graceful in pose, and well rendered in every detail; his other examples are excellent.

L. Berry has some very careful work, well worthy of notice. J. B. Maguire, of Jersey, contributes very good work of a highly finished character. T. P. Whaite, an old contributor, sends some of his well-known studies, very soft and delicate; his frame of "Niggers" is very amusing. J. Austin sends some examples which are fairly good. W. J. W. Stocks also contributes, and W. P. Marsh again sends some breaking seas on the beach, very similar to his previous exhibits.

G. Renwick is highly commended for his picture, "Preparing for a Rainy Day."

E. T. Shelton shows some good work, highly finished. P. H. Fincham sends a frame of lantern transparencies, which would have been better if of a warmer tone.

G. Mold has a very good interior of St. Mary's Church, Banbury. His express train pictures are very poor; the time had better have been spent on a different class of work.

G. Honey sends an enlargement of a small picture sent last year, "Feeding the Swans." It is picturesque, but faulty in combination, part being apparently in the studio, with a scenic background, and a part out of doors, which shows very plainly in the large picture.

J. M. Brown contributes some good 15 x 12 pictures of breaking waves.

Jno. Terras has some pretty little pictures (reminding us very much of Adam Distin's works) displaying great knowledge, artistic taste, and careful study.

Morgan and Kidd show some good examples of enlarging on opal from carte negatives, highly finished in black and white; another enlargement on paper of fishing-boat, &c., is awarded a first bronze medal, being very fine indeed.

H. Hughes is represented by three frames, his figure study being the best. Johnson Brothers have some very fair enlargements; the best is Henley Regatta. E. Milner also sends two pictures of Henley Regatta, which are marvellous instantaneous productions, being perfectly sharp and fully exposed; likewise two London street views, which are by far the best we have ever seen. Mr. Milner is in the employ of Messrs. Frith & Co., the eminent firm of photographers.

J. P. Gibson has some charming pictures, beautiful in tone and very artistically treated. "On the Allen" is awarded a first bronze medal.

G. Whaley sends some very clever productions. A very amusing one tells its own tale—"Only for my Ears," a postman reading a servant girl's love letter; she is stopping his ears with her hands while he reads.

F. Argall, of Truro, has some clever figure studies, the best is "Rebecca at the Well." It is just a trifle too hard, but we are pleased to find him going in for this class of work, and hope to see more of his productions in the future.

H. N. King exhibits six transparencies of interiors of Buckingham Palace, taken by permission of the Queen for publication. They are very fine examples.

"Yacht Racing," a frame of racing yachts in full sail, by Messrs. West & Son, are wonderful specimens of this class of instantaneous photography, simply perfect, the cordage and everything being absolutely sharp; the difficulties must have been immense. The Society's first silver medal has been awarded to these.

J. H. Coath has three frames of portraiture.

Geo. Smith, of London, exhibits a frame of lantern transparencies by the Woodbury process, awarded a second bronze medal; they are excellent in quality and good in tone.

Geo. Hadley sends a frame of clever pictures, which are very good.

AMATEUR.

Geo. Bankart has been awarded a second bronze medal for his frame landscapes; they are very good, but would have been better if they had been a little warmer in tone.

H. B. Hare again sends some very creditable work, "Cows Drinking" being the best.

E. Brightman has been awarded a first bronze medal for the "Village Smithy," which is capital; he has also many others of excellent merit.

"A Flash of Lightning," by Dr. Puddicombe, R.N., is very curious. "Nest of birds," A. G. Tagliferro, although small, is exceedingly good.

A. Pringle has been awarded a second silver medal for his Spanish subjects, "Spanish Architecture," which are very soft and delicate, and well up to the standard of this gentleman's work previously exhibited. He has also several other studies of very high order.

The instantaneous pictures by C. Preston are little gems in their way, soft and delicate, showing careful manipulation and artistic taste.

J. G. Gibson contributes productions very varied in character, of very unequal merit, and very poor. An old vessel, "The Centenarian," is the best, but might have been improved had it been a little higher up in the plate. Ferrotype work, of which he also sends specimens, is quite out of place in an exhibition, being, in the estimation of the Judges, rubbish; his contribution of lantern slides is very indifferent.

PHOTOGRAPHIC APPLIANCES, &c.

George Smith exhibits a Sciopticon lantern with several improvements, also Edward's patent lantern slide changer, which is very efficient for the purpose intended. A portable small camera, by the same exhibitor, is most ingenious, with several important improvements, and is very highly commended.

J. H. Steward sends a very ingenious graduating diaphragm. If adopted for use between the lenses it would be very valuable by way of preventing the losing of stops, or leaving them at home. He also sends a very good form of lantern-slides changer (Rudge).

A model slide to camera, by Joseph Smith, is a very poor affair.

The Biophantoscope, by J. A. Rudge, is complicated, and in the opinion of the Judges too elaborate to be of much use.

George Hare sends his camera, the same exhibited a year or two since, with several very important improvements. It is more compact and lighter, and in the opinion of the Judges, the best and the most simple camera, with every possible adjustment that is needed. It was awarded a first silver medal when last exhibited, which precludes it from again taking an award; but the Judges very highly commend it, and they must not omit to mention the very simple finder that is attached to it, which is of the greatest utility for moving objects.

Sands & Hunter, of London, send several cameras, instantaneous shutters, &c., and are highly commended for excellence of workmanship.

The most important feature in this department is the exhibit of Messrs. Eastman & Co., of their film-roller slide, which bids fair to open a new era to photography; the workmanship is very fine and effective, and the Judges have awarded them a first silver medal. By some means they have been able to get over a very great difficulty, namely, the texture of the paper. This they appear to have done perfectly, for when oiled it looks more like ground glass than paper. The paper can be had of any size, and is very suitable for enlarged negatives. The paper can be used in ordinary dry-plate slides in small light frames, which they also manufacture, and which keep the paper perfectly flat during exposure.

NATURAL HISTORY.

JUDGES :—*Rev. Canon Rogers, Chairman; Rev. W. Rogers, Mr. G. H. Fox, Mr. Howard Fox.*

The Judges of Natural History report that there are papers and exhibits of considerable interest in their department. A second silver medal is awarded to F. W. Smith for four volumes of British and foreign ferns, mosses, algæ, and zoophytes, very numerous, well selected, and neatly mounted, with the colours admirably preserved; some of the zoophytes being illustrated with pencil microscopic sketches of details. These volumes would have been rendered still more valuable if they had been classified. A prize of 10s. each is given to two other collections of plants, one of 113 species (Miss K. Coode) distinguishing the poisonous from the non-poisonous. The specimens are too small, but the colours are well preserved. The other, of 45 plants, collected during a fortnight's tour in North Wales, by J. G.

Wills, are fair specimens and well dried. Neither of these two is free from errors in naming. A first bronze medal is given to J. Snell for a very interesting collection in cases and bottles illustrating the marine invertebrate fauna of Falmouth and adjacent coast, accompanied by a rough note-book containing sketches indicating great industry and perseverance. A sum of 7s. 6d. is awarded to a fairly mounted but imperfect collection of butterflies and moths by Ambrose Mayne, a youth of 17. Two very good sets of beehives and appliances, presenting some of the latest improvements, are shewn respectively by Abbot Brothers, and C. and J. Harris, each of which receives a first bronze medal.

The Judges are especially glad to have original essays by practical observers, and have awarded a second silver medal to Mr. Matthias Dunn, of Mevagissey, for a valuable paper on the habits of the pollock, as observed by himself in the course of his experience as a fisherman. It is accompanied by five bottles, containing specimens from one to five months old respectively. The Judges recommend that the paper be printed in this year's report. A prize of 10s. is given to J. Porter for natural history notes relating to the Perranwharf Valley. It has been suggested that such observations should be reported triennially, with far more detail as to dates and other facts. A paper on the garden botany of Cornwall, by W. Roberts, receives 7s. 6d. The list is indefinite and incomplete. A carefully compiled list of greenhouse plants which are hardy in this county, would be valuable and instructive as to the influence of the Cornish climate on plant life. Mr. Howard Fox kindly exhibits one case of pitchstone porphyry, rocks, and fossils from the island of Eigg, one case of Archæan and Cambrian rocks from Sutherlandshire, and fossils from Loch Aline and Skye, and one case of gneiss from Arran, dried plants and other interesting objects; accompanied by photographs and sketches illustrative of the geology of the district.

LANDER PRIZES.

JUDGES:—*Mr. F. J. Bowles, Rev. F. R. Hole, and Miss Tregelles.*

There are only three competitors in this class, and the Judges consider that neither of the essays is sufficiently good this year to merit the first or second prize. They have pleasure however in recommending prizes of 10s. each to F. S. Hilcke and V. J. Cumming for neat and capital maps of Afghanistan and the Punjaub. The third map is considerably inferior in merit, and the essay, which is better, is disqualified, in consequence of the age of the competitor not being stated. The Judges would again strongly advise the young competitors to use their own words in their essays, and not to copy so much from books. They hope that another year there may be more competition, so that they may be able to award the higher prizes offered.

SHORTHAND.

JUDGES:—*Mr. R. N. Worth, F.G.S., Mr. W. L. Fox, F.R.Met.Soc.*

The Judges of Shorthand note with pleasure an increase in the number of competitors, and a fair average quality of work done. At the same time none of the competitors reach what the Judges consider should be regarded as a fair reporting standard. They recommend that in future no competitor have an award a second year, unless marked advance is displayed. The awards are:—H. Williams, Truro, 20s.; W. J. C. Gummow, Falmouth, 15s.; J. Eustice, Camborne, and S. J. Hooper, St. Agnes, 10s. each; J. Mullins, Mithian, and Mary Uren Francis, Pool, 5s. each; and W. H. Harris, Illogan, 2s. 6d.

LACE AND ART NEEDLEWORK.

JUDGES :—*Mrs. Haslope, Mrs. M. V. Bull, Mrs. Robert Fox.*

The Judges of Art Needlework report that the specimens of art needlework are not numerous, but are many of them of merit, especially the portiere (Mrs. A. Freeman) and the day quilt (Miss Julia Genn) for old historical designs. Miss Maggie Day's specimens of art embroidery would have received a prize had it not been on a stamped ground, as the colours and work are so good. Mrs. C. Fox's "Centre for dinner table" the Judges consider spoilt by the careless work in the border.

Exhibition Notes.

On **Tuesday** evening an admirable lecture was delivered in the Hall by Mr. J. H. Collins, F.G.S., "A Mining Journey to North Mexico." Mr. Collins's account of his adventures was most graphic and vividly interesting from beginning to end. Receipts for the day £18 4s. 6d., including £4 18s. 6d. for catalogues.

On **Wednesday** there was a large attendance of visitors from a distance. The special engagements of the day were the reading and discussion in the morning of Mr. Matthias Dunn's paper, "Some facts in the Life History of the Pollock" (which is printed in the Report) and a capital lecture in the evening by Mr. Howard Fox, illustrated by specimens and photographs, "A Fortnight in the Hebrides with a Geologist." Receipts £26 8s. 6d., of which £3 1s. 0d. for catalogues.

On **Thursday** afternoon the Society were indebted to Mr. W. Brooks for a "Demonstration of Eastman's Negative Film Apparatus"—the latest novelty in photography—which was highly appreciated. In the evening there was a well attended and thoroughly successful concert, under the kind honorary direction of Mr. C. W. Robinson. Receipts £22 15s. 6d.; £1 11s. 0d. for catalogues.

On **Friday** evening the Drawing for Prizes in the Art Union took place. Receipts £13 2s. 6d., including £1 for catalogues.

Saturday brought the Exhibition to a close. The receipts for the day were £8 16s. 9d; catalogues 12s.

The total takings for the week, including £3 for season tickets, were £92 7s. 9d., which is a fair average of ordinary years.

Exhibition Details.

THE WATT COLLECTION OF DRAWINGS.

One of the most remarkable and interesting features of the Exhibition was a set of drawings, 92 in number, by James Watt, dating from 1776 onward to 1797, and lent, together with register books of the performances of early Watt engines, and specifications, by Messrs. James Watt and Co. They largely referred to Cornish engines and machinery, and recalled several once very familiar names, such as Tingtang, Ale and Cakes, Wheal Virgin, Polgooth, Retallack, Poldice, and Chacewater. The only mine still existing represented in the series is Dolcoath. The drawings deal with engines and machinery of all kinds, within Messrs. Boulton and Watt's operations, and are capitally executed, clean, clear, and precise, showing the hand of a master in well nigh every touch. Some of the accompanying letters are full of interesting facts, treating on Watt's connection with the county and its industry.

PATENT MAGNETIC ORE DRESSING MACHINE.

F. J. King, London.

First Silver Medal.

Many of the ores of Tin, Copper, Zinc, &c., raised in this and other countries, are associated with Iron in various forms,—such as pyrites, magnetic oxides, and carbonates. The removal of the iron, owing to its specific gravity being so similar to the other more valuable ores, involves much expense and loss when

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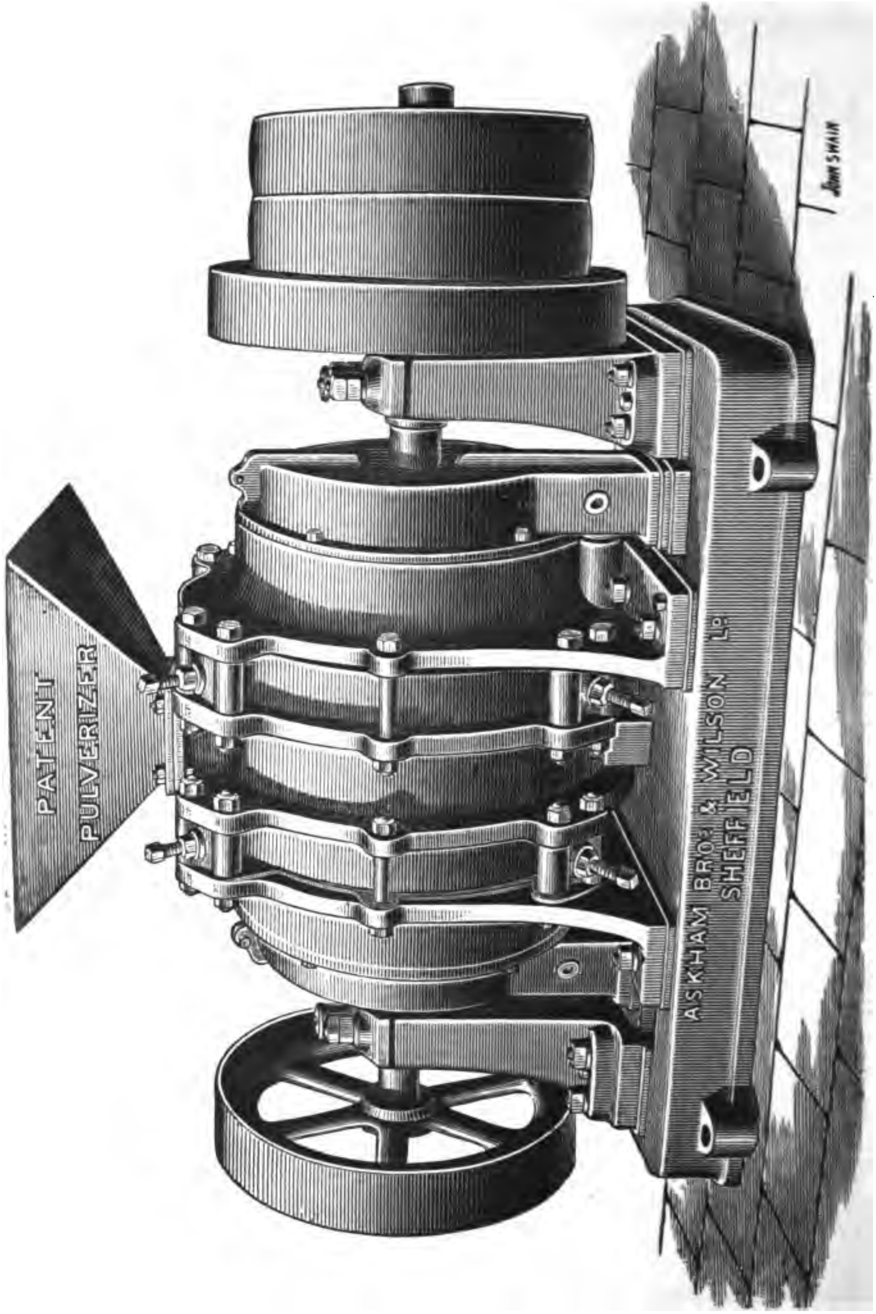

PATENT PULVERIZER
ASKHAM BROS & WILSON Lᴰ
SHEFFIELD
JOHN SWAIN

dressed by water. One of the objects of King's Magnetic Machine is the separation of the iron in a dry form, and thus to save much of the tin and other minerals now washed with the iron down the rivers. The first machine designed for the magnetic separation of ore was introduced by Mr. King to Cornwall some years since, and the silver medal of the Polytechnic Society was awarded as well as the *Mining Journal* Special Prize. It was used with success in separating spathic iron from blende; but the obstacle in all attempts hitherto made in magnetic separation has been the difficulty in obtaining a clean result, the magnetic particles carrying with them some of the non-magnetic particles. These being usually the more valuable products, such machines have not been largely used. The difficulty appears to have been entirely overcome in the machine now introduced, even with ore in the finest state of division. Magnetic action is introduced beneath the shaking inclined table that brings the stuff from the hopper under the influence of the principal magnetic battery, which is fixed on a revolving drum. The stuff thus has a preliminary sorting. Permanent magnets are used in this form of machine, and by the simple device of placing the magnets with their poles alternating, each magnetic particle has a turn over between each pair of magnets. The separation is most complete.

LUCOP'S PATENT CENTRIFUGAL PULVERISER.

ASKHAM BROTHERS & WILSON, LIMITED, SHEFFIELD.

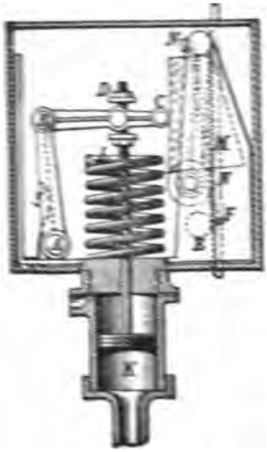
First Silver Medal.

This apparatus, which was shown both in model and in actual operation, consists of a cast-iron cylinder, intercepted by a steel ring. On the shafting within the cylinder are two arms with slots for rollers to work in, and these rollers are kept rubbing against the ring by means of the centrifugal force, the machines running according to circumstances from 180 to 320 revolutions a minute. The shaft is a little out of centre, which gives an eccentric motion, materially adding to the grinding power. The sides of the cylinder or drum contain sieves against which the triturated stuff is thrown by propellers, bladed on a twist, and when sufficiently fine driven through. This is in the case of sieves of some 1,600 apertures to the inch; and 20 to 35 cwts. of gold quartz can under these conditions be dealt with per hour. When the stuff is brought down finer, to an impalpable powder, an exhaust fan is used. It will grind all materials, hard or soft, and those that are of greasy nature, and though doing its work as a rule dry, can be adapted to work with water. The wearing parts are few, and easily replaced. The trial at the Docks gave the Judges the highest satisfaction.

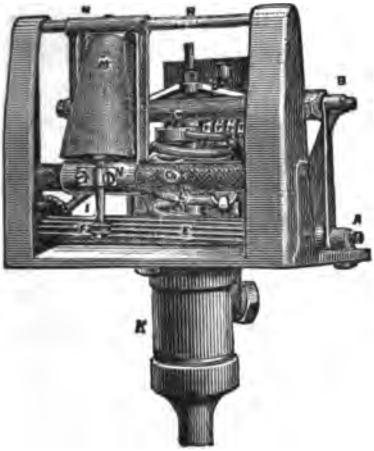
ASHTON'S NEW STEAM POWER METER AND CONTINUOUS INDICATOR.

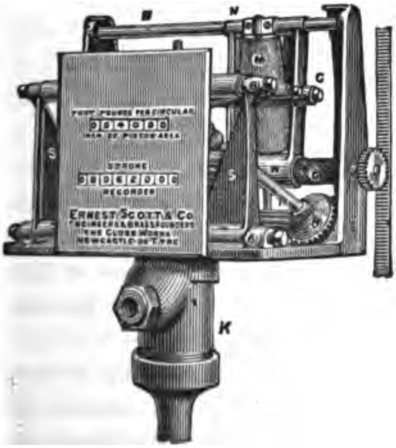
ERNEST SCOTT & CO., NEWCASTLE ON TYNE.

First Silver Medal.



This Indicator consists of a small double-acting cylinder, each end of which is connected to the corresponding end of the steam engine cylinder, and the connections being large and continuously open, it is ensured that the pressure in the meter cylinder is at all times equal to that in the engine cylinder. Another portion of the apparatus is connected with the crosshead, or some proper reciprocating part of the engine, and represents the velocity of the piston of the engine. The pressure on the engine piston during its forward and backward stroke on the one hand and its velocity on the other, during the same time, are compounded together by a new integrating apparatus having a positive action, completely different to all previous forms of integrating arrangement, which have all hitherto depended for their motion and recording efficiency on the uncertain frictional cohesion of two smooth rubbing surfaces, while even these surfaces were being forcibly slid across each other at the same time. The Indicator is thus absolutely reliable, and supplies the simplest and most effectual means of contrasting the actual steam power with the cost and amount of fuel consumed; it also possesses the advantages of not only measuring the power developed during a double stroke of the engine with as much exactness as the ordinary indicator does a single stroke, but likewise of registering this power as exactly as it is measured; and what is of much more consequence, this measurement and registration are effected continuously for the whole number of double strokes made by the engine during the entire period of work,





whatever variation in pressure or speed may occur between the individual strokes. The instrument thus shows at all times the measure of the power developed by the engine to which it is applied, and registers the aggregate of that power during any period required.

BARUM WARE.

C. H. Brannam, Barnstaple.

First Silver Medal.

"Barum Ware" is the name given to a modern development of a very ancient style of pottery which has been made at Barnstaple for centuries—a truly home-growth form of sgraffito. Mr. Brannam has brought the ware to the highest pitch of perfection, and the collection of articles shown by him formed a prominent feature in the exhibition. In modelling and finish, design and colour, the Barum pottery is at once thoroughly original and thoroughly artistic, and its quaintness and beauty all its own.

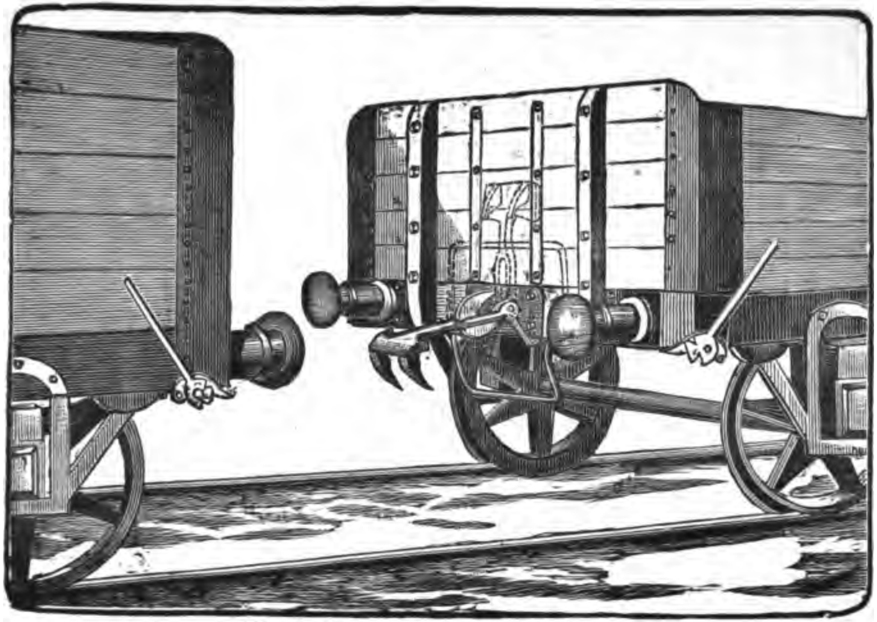
THE BROCKELBANK RAILWAY COUPLING.

T. A. Brockelbank, London.

Second Silver Medal.

The considerations which have led to the invention of this simple and effective apparatus are well set forth in Mr. Brockelbank's summary of the results of Manual Coupling:—

A man engaged in shunting cannot often take time to run, much less walk, from point to point at which he is required to couple, and for this purpose he constantly climbs an engine or vehicle in motion; or, in the duty of coupling, he slips, perchance



THE BROCKELBANK RAILWAY COUPLING.

is knocked down, or stumbles, and the vehicle runs over him, or he is pinched between the buffers, and then indeed his life becomes "as a tale that is told." The frequency of casualties to railway servants in the working of traffic, especially upon these systems which are cumbered by heavy goods and minerals, makes it a matter of urgent importance that the safest mode of working which can be devised, consistent with economy and efficiency, should be brought into operation with as little delay as possible.

The *Bodily Labour* expended is of a most exhausting character.

The *Loss of Time* entailed can be rarely made up.

The *Congested Traffic* resulting becomes the rule.

The Lives and Safety of Passengers are thereby jeopardized.

So long as railway men, goods guards, shunters, and others have to go between carriages and waggons, often on the move, the risk incurred during long hours of work, in connection with goods traffic, especially at night and during the dark hours of short winter days, cannot be materially diminished; greater care, it is true, is now taken than was once the case to avoid unnecessary danger, but the number of shunting accidents as returned by the railways for seven years ending 31st December, 1884, was over 10,300 out of about 14,000 men employed, and of this number over 4,000 occurring to men whilst coupling and uncoupling vehicles, or caught between buffers, is sufficient evidence that the root of the evil is still untouched; but, when we realise that railway companies can actually save a very large sum annually in working expenses by adopting Automatic Couplings, this much becomes certain, that whether the dictates of humanity, or the more sordid motives of economy, prevail, the present defective system cannot be much longer maintained.

Mr. Brockelbank's new substitute coupling is perfectly automatic, and can be adapted with ease to existing stock, the old drawhook being retained, and there being no interference with drawbar, headstock, or underframe. Suspended from the drawhook of a waggon, on the bolt now fastening the chains of waggons, is a bifurcated shaft, extending outwards on a line with the drawbar until it terminates in a broad flat head, having at its underside duplex grappling hooks turned under and outwards. From the bolt fastening the divided shaft extends downwards and widens to admit of the two ends resting underneath the headstock of the waggon, thus suspending the coupling squarely until in action, when their supports become withdrawn. The dangerous, and at times very difficult, practice of uncoupling by getting between the vehicles is obviated, a simple lever at the side disengaging in a moment, while contact with a waggon like fitted is all that is needed for secure grapple.

A subsidiary but no means unimportant advantage is the reduction of the space occupied by a long train, by regulating with adequate precision the distance between the waggon and carriages. Since the exhibit at this Exhibition the Isle of Wight Railway has contracted to fit it to waggons running in all their goods trains, and an important advance has been made which speaks loudly for the future success of this invention.

CEMENT-TESTING MACHINE.

J. L. Spoor, Gateshead.

Second Silver Medal.

This machine is for testing the strength of cement and concrete, and is constructed by erecting an upright hollow column on a bedplate, 18 inches by 10 inches. Inside of this column is suspended from springs a hopper containing small shot. The weight of this shot multiplied by the leverage of the machine is indicated on a dial on the outside of the column by means of rack and pinion. The hopper has an outlet provided with a slide. Immediately beneath this outlet, and suspended on the end of a lever, is a cylindrical receiver, into which the shot runs from the hopper. The weight of shot thus received, multiplied by the total leverage of the machine, is the amount of tensile strain applied to the cement-briquette in the clips. This weight or tensile strain registers itself immediately the briquette breaks and the slide is closed.

PHOTOGRAPHIC SUNSHINE RECORDER.

J. B. Jordan, London.

Second Silver Medal.

Since the invention of Mr. Campbell's device for registering the duration of sunshine by the burning power of the concentrated solar rays, various forms of this instrument have been adopted at Observatories and Meteorological Stations, where the hours of bright sunshine are regularly observed and registered. These instruments are perfect recorders of sunshine so long as the sky is clear, but when the sun is slightly obscured by thin filmy cloud or haze, the burning action is somewhat arrested, and much sunshine left unrecorded. In Jordan's Recorder this drawback is obviated, inasmuch as the results are obtained by means of photography, instead of by the burning power of the sun's rays. The instrument consists of a cylindrical dark chamber, on the inside of which is placed a carefully prepared photographic paper. The ray of sunlight being admitted into this chamber through small apertures in the side, is received on the sensitized paper or chart, and travels over it by reason of the earth's rotation, leaving a distinct trace of chemical action, thereby registering its duration and the relative degree of its intensity. The charts are printed on sensitized paper, ruled with vertical lines, representing the hours and minutes of the day.

IMPROVED LINE-THROWING APPARATUS, FOR USE ON SHIPS, TUGS, &c.

COPELAND AND LACEY, LONDON.

Second Silver Medal.

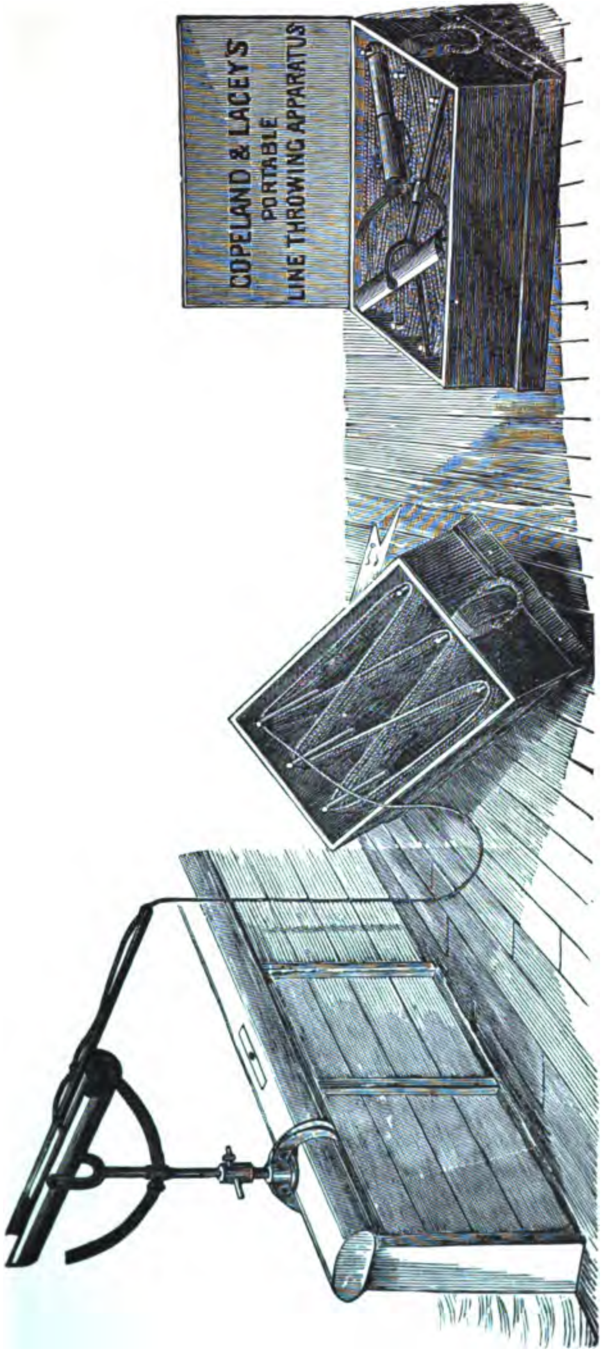
This rocket-line apparatus enables vessels to have ready at hand the means of effecting communication with other vessels, or with the shore in heavy seas, in case of wreck or collision, and is specially valuable for passenger, emigrant, and transport vessels, and for steam tugs for getting tow-lines on board. The whole apparatus is packed in a box, easily portable. The average range of the rockets is from 150 to 200 yards, and altogether a convenient, handy, and valuable adjunct to a vessel's outfit is cheaply afforded. It enables vessels to effect their own communication where the shore apparatus is not available, and is useful in many other ways for saving property and life, and especially in the case of disabled ships; while it is so arranged as to be ready for use at a moment's notice.

LIARDET'S LOWERING AND DETACHING APPARATUS FOR SHIP'S BOATS.

ERNEST SCOTT & CO., NEWCASTLE ON TYNE.

Second Silver Medal.

This highly ingenious, and at the same time thoroughly simple invention, was shown in working model, and acted to perfection—the boat lowered being released the moment she became water-borne, and only then.


COPELAND & LACEY'S
PORTABLE
LINE THROWING APPARATUS

CRUISING CANOE.

R. J. Turk, Kingston on Thames.

Second Silver Medal.

This canoe formed a very prominent and attractive object in the centre of the hall, and was much and deservedly admired for the completeness of its arrangements and the beauty of its finish. It was 14ft. by 2ft. 9in., fitted with self-reefing gear, sails, centre board to lift out, back board, which could be fixed in three different positions, and was built to combine as far as possible good cruising qualities with those demanded for sailing under any circumstances—strength and lightness. It had lowering masts that could be stepped in two positions, new foot steering bar, adjustable to any length of leg, waterproof apron, good space for stowage of luggage, and a rudder with improved circular metal yoke, and so hung that it could not get unshipped in passing over shallows. The same exhibitor also had a first bronze medal for his "Radix" folding centre board, one of the most handy arrangements ever devised.

INJECTOR AUXILIARY.

S. R. Hawke.

First Bronze Medal.

This is a valuable apparatus for increasing the efficiency of Boiler Injectors (more especially those possessing but a low lifting power), enabling the injector to lift water from a depth of 25ft., and of a higher temperature than usual—150 to 160 degs. F. The ordinary injector has a lifting power of from 2 to 12 ft., dependent on the size; small injectors having a lifting power of from 2 to 5 ft. only, while they will not lift water of a temperature above 125 to 135 degs. F. Moreover, when the injector is required to lift from near the maximum depth, it is uncertain in its action, and it is also uncertain when the water to be lifted is of a temperature of near 130 degs., rendering the injector difficult to start.

The advantages gained by the application of the auxiliary as set forth by the inventor, are as follows :—

It insures the prompt and easy starting of the injector.
The injector is instantly cooled should it happen to blow.
The injector will lift from a greatly increased depth, viz., 25 ft.
It will lift water of a much higher temperature.
It imparts a high lifting power to small injectors, by the use of which slow or constant feeding to the boiler is obtained; an obvious advantage when the water is forced through a feed heater, being rendered hotter in consequence.
It is well adapted for feeding anti-incrustation fluid, thus combining two appliances in one.
It may be applied to any injector.
It may also be applied with advantage to feed pumps to insure certain starting.

The trials made by the Judges were of the most satisfactory kind.

AUTOMATIC DISCHARGING AND RIGHTING SKIP OR WAGGON.

KITTO, PAUL, AND NANCARROW, LLANIDLOES.

First Bronze Medal.

In this thoroughly practical apparatus the skip or waggon is of wood or iron, and runs on wood or metal guides, fixed either vertically or at any angle that may be required. It is drawn forward by a hauling rope connected to the centre of a bow which passes along the front of the skip, and along its two sides, and which is at its two ends connected with the axle of the hind wheels. The ways at their upper or discharge ends are so formed that on the skip arriving at those ends it turns over, empties, and rights itself without any attendance. The skip can be worked in any road now in use by a simple alteration of the point of discharge on top of shaft. It is now in use in both vertical and crooked shafts, and has been in operation at Frongoch Mine, Cardiganshire, for more than twelve months. The automatic waggon is also in use on a horizontal and inclined road for getting stuff up to machinery, and can, of course, be adapted for raising material from clay pits, quarries, &c., to any height required. The front end of the waggon is secured to the bow, so that the front is opened at the same time that the waggon is tipped. This is likewise perfectly self-acting, and requires no attendant.

ENSILAGE GEAR.

AMOS & HUNT, WESTBURY ON TRYM.

First Bronze Medal.

This is an adaptation of the pressure principle in ensilage to stacks, the pressure being applied by special gearing, worked with levers. A composition is also used to prevent moulding. In stacking green crops, all that is necessary is to build up the stack regardless of weather or season, first putting a few bars or poles under the stack at distances of from 4 to 6 feet apart, the ends projecting so that chains may be made fast to them, care being taken that the stack is built upright, and not allowed to sink on one side. When the stack is topped up, just as an ordinary hayrick would be, but with straight ends to the roof, a few poles or bars put lengthways along the roof are all that is requisite; chains are then brought over the stack, and the gears and levers give the needful pressure, the chains being made fast at any given point by means of simple "S" hooks, so that the gear may be unhooked and used elsewhere. Every stack should be built rather wider at the eaves than at the bottom, so that it may drop dry in wet weather; and if a uniform quality of "sweet" silage is required, the stack must not be built up too rapidly, but the bottom portion must be allowed to heat up to the temperature required—(the weight of the top portion of the stack would arrest this heating if put up too soon)—and it is necessary to have a piece of tubing or a wooden box built into the lower part of the stack, as well as another piece higher up, so that the temperature may be taken at different points at any time by means of a thermometer tied to a stick; for good "sweet" silage the heat should be allowed to get to 120 degs., and rather over than under; "sour" silage being made by putting on pressure as soon as the stack is made, so that heating cannot take place. Two of the gears and two levers will do all that is really necessary, but the gears must be unhooked and re-hooked again at each end of the different chains as pressure is applied from chain to chain. The lever is easily worked by one man, and the time taken at each gear need not exceed three minutes; while there is no need whatever to apply the pressure every day, intervals of several days being amply sufficient after the first day or two.

HERMANN'S PATENT WIRE FLOORS.

Lewis Olrick and Co., London.

First Bronze Medal.

These malt-kiln floors are regarded as offering a perfect solution to a very important problem in malt drying, viz., the obtaining of a rigid and practically indestructible floor, combined with the maximum space for the upward passage of heated air. Their uniformly smooth and rounded surfaces cannot become filled up, nor will they cut or bruise the grain during the operation of turning. The floors are constructed of wire in the form of large hurdles. There are spaces of barely 1-16th of an inch between the wires, which run side by side in a longitudinal direction, and have no wires crossing at right angles as in ordinary woven floors. At intervals of about 3 inches the wires are wound round iron rods 5-16ths of an inch thick; the result being an exceedingly strong, rigid, and almost indestructible floor, capable of being fixed to any existing supports, or, in the case of new kilns, to supports of a very simple and inexpensive description. The hurdles are made in any length up to 100 feet, and of widths most suitable for the kiln, so that when the floors are laid the whole upper surface is uniformly smooth and even.

WICKSTEED'S PATENT TUBE BEADER.

J. Gibb & Co., London.

First Bronze Medal.

The advantages of beading boiler tubes are well recognised, and this apparatus forms a most satisfactory tool for the purpose. The axles of the rollers are placed at an angle to, instead of square with, the tube, and this brings the pressure to bear in the requisite outward direction, allowing the rollers to move on their axles and adjust themselves to the variations of the diameters of tubes nominally the same size, thus avoiding all packing of the rollers, and burrs left inside the tube; also very considerably easing the work. The tool is so constructed that it takes no more room than the bead, hence enabling it to bead a tube running in close proximity to the flange of the plate. The jaws that fix the beader in the tube are so arranged that they, in all cases, get the support of the tube plates, making it impossible to burst or injure the tube. The beader is self-feeding.

THE "CERUS" TRAPS.

CONOLLY & CO., LONDON.

First Bronze Medal.

These traps are of earthenware, each made in one piece, occupying but little space, so made as to give a 3-inch water seal and rapid action, with cleansing inlets and air-tight covers. They are thus generally convenient in application and control. The medal was awarded with special application to the "grease gully."

THE "STAR" MICROSCOPE.

R. & J. BECK, LONDON.

First Bronze Medal.

This microscope has been constructed to combine thorough efficiency with great economy. It is nickel-plated throughout, with the exception of the base, which is solid in design, and contrived so that the instrument is steady in every position. It is thoroughly suited for the student's work in physiology and the laboratory, for the botanist in his vegetable researches, for the medical man in his everyday investigations, or for the enjoyment or recreation of the amateur. Whilst very simple in construction and extremely moderate in price, it is capable of receiving additions entitling it to be termed a complete instrument. The object glasses and eye pieces are accurately worked, purely achromatic, and thoroughly suited for scientific research.

MINING COMPASS AND CLINOMETER.

J. H. Steward, London.

First Bronze Medal.

This is a very compact and handy arrangement for measuring slopes, verticals, and horizontals, of a special pattern, which has been much approved in professional practice. In measuring slopes it indicates the rise in inches per yard.

PATENT SEAM.

T. G. Tugg & Son, East Moulsey

First Bronze Medal.

This patent seam is applicable to a number of purposes beyond that for which it was originally intended—for planking vessels of light construction, such as life buoys, whale boats, steam yachts, and launches, rowing boats and punts, for forming air-tight chambers and cylinders, deck cabin tops, water-tight partitions, and various purposes on land where a damp-tight joint is desirable. The seam is formed by bringing the edges of the timber together, with one or more layers of a highly absorbent ribbon of cotton material between, the ribbon having been thoroughly impregnated with a special form of cement made from copal and other gums, somewhat similar to a thick varnish, which does not readily oxidise, and consequently lose its elasticity. It is claimed for this seam that it is practically everlasting, and capable of withstanding all weathers and temperatures.

RAFT SEAT FOR SAVING LIFE AT SEA.

A. H. Williams, London.

First Bronze Medal.

This is a very simple apparatus, which can be fitted to the existing seats of any vessel at a very trifling cost, and supplies instantaneously, in case of need, floating power at the rate of two persons for every foot run. Thus, a vessel can carry, without inconvenience or any interference with necessary space, sufficient means for saving all passengers on board, however numerous. A deck seat can be converted into a raft by two men in thirty seconds. When opened out it forms a raft consisting of two air-tight platforms. These platforms are connected together by a strong wooden framework, two feet wide, and to this is attached a folding contrivance of canvas, or any other suitable material, which, in rough weather, can be let down into the water, and thus steady the whole structure. The raft will support a large number of persons, and is suitable for ocean-going vessels. It can be fitted with mast, sail, oars, water, provisions, &c.

BARSTOW'S PATENT COMBINATION WATER FILTER.

W. L. Barstow, Pontefract.

First Bronze Medal.

In the filter the water is passed through two media—natural stone of the old "dripstone" character, and specially prepared carbon. The advantages thus gained are that all the solid matter held in suspension in the water remains on the surface of the stone, which prevents the carbon from becoming impregnated with slime and impure matter. The carbon being thus kept free from all suspended matter, acts as a second filter, and removes the impurities held in solution. The aeration of the water is effected by causing the air to come in contact with the water as it passes through the stone into the air chamber, the reservoir for the pure water being supplied with fresh air by means of two air pipes.

IMPROVEMENTS IN LIFTING SASHES AND FRAMES.

W. B. Carne, Kingsand.

First Bronze Medal.

The object of this invention is to enable anyone, however unskilled, to take out the sashes from their frames and bring them into the room for purposes of repairs, painting, cleaning, or any other purpose, and to re-hang them without removing beads or parting slips, and without the aid of any tools. This result is attained by a very simple and ingenious arrangement of the pulley stiles, with an entire absence of gearing and mechanism.

FRICTIONLESS HYDRAULIC SAFETY HOIST.

S. G. Bennett, Birmingham.

First Bronze Medal.

The chief points of this well-arranged apparatus, which was shown in model, are as follows:—The ram always in compression, and supporting the load directly, the friction of the moving parts reduced to the minimum, the absence of any reasonable probability of accident by the giving way of any part of the mechanism, and non-liability to disarrangement or leakage.

POTATO WASHER AND PEELER.

F. AND C. HANCOCK, DUDLEY.

First Bronze Medal.

In this apparatus washing and peeling are jointly, speedily, and economically effected, by the rubbing of the potatoes between a stiff revolving brush in the centre of the apparatus, and a steel lining pierced with burred holes much after the fashion of a nutmeg grater. It is a most useful domestic adjunct, and for institutions is made large enough to work by steam power.

PATENT BUTTER MACHINE.

F. AND C. HANCOCK, DUDLEY.

Second Bronze Medal.

The machine washes butter by squeezing it under pressure through small holes in a cylinder, removing all traces of milk or salt, "turning salt butter into fresh without handling." It is likewise a capital potato masher.

BAUER'S TUBE AND BOLT VICE.

J. GIBB & CO., LONDON.

Second Bronze Medal.

This little apparatus is perfectly self-adjusting, self-gripping, and self-acting. The greater the resistance the tighter the grip. Not only is it efficient, handy, and compact, but light in weight.

KINNEAR'S PATENT SELF-LIGHTING GAS BURNER AND GOVERNOR.

J. E. Downing.

Second Bronze Medal.

This device consists of an arrangement whereby, when a gas burner is turned off, there is a pilot light maintained in a hollowed part of the burner holder, from which the burner ignites again when the gas is turned on. The pilot light chamber is covered with a porcelain cap, through which sufficient light is visible to show the burner.

In the conductor to the main burner there is fixed a governor, allowing only sufficient gas at a normal pressure to pass through. It is claimed that on trial this governor effects a saving of nearly 30 per cent. of gas, and causes a steadier, clearer, and quieter flame. Taking from this the small percentage burnt by the lighter, a saving is claimed of over 25 per cent. of gas in using the self-lighting burners.

ROAD SWEEPING MACHINE.

R. W. Taylor, Bury-St.-Edmunds.

Second Bronze Medal.

This was shown in model, and was evidently a compact and handy arrangement, easily and cheaply worked.

PARABOLIC ENGINE GOVERNOR.

J. Tangye, Redruth.

Award adjourned for the results of Trials.

This governor was one of the most interesting engineering exhibits in the hall, and very favourably impressed the Judges, who considered that if it attained its object, a point only to be settled by actual trials, it would be worthy of a medal of the first class. In this device cross-arms and balls are turned upwards to get an approximate parabolic curve of the centre of the balls. If a perfect parabola could be attained there would be no variation in the speed of the engine; but as this would involve very complicated arrangements, Mr. Tangye's object has been to approximate as closely as was practically possible.

"VIBRAPULT" PUMP OR MOTOR.

J. Q. DUNSTAN, FALMOUTH.

Highly Commended for Ingenuity.

This new water motor or pump is a very compact arrangement. The cylinder is connected directly to its crank, and oscillates on two hollow trunnions, whose axial centre is at right angles to the centre line of the cylinder. Ports are formed in the trunnions, connecting each end of the cylinder therewith at opposite sides. When, from shortness of stroke, the angle of oscillation is insufficient to give an adequate area of opening in one port, two or more ports are formed connected to the one common passage leading to the cylinder ends. By the oscillation of the cylinder these ports move backward and forward relatively to fixed ports or passages in pipes within the hollow trunnions. When one port in one trunnion is operating inductively the port in the other trunnion is operating eductively; and the direction of crank motion depends upon which of the ports is made inductive. This motor is absolutely self-contained; the water is applied directly; it has only three moving parts, all of which are adjustable; it works in any position; and it is quite noiseless. Used as a pump it cannot be choked, and the reversal of the motion clears any possible obstruction of the suction. Its application to underground haulage in mines is suggested by its connection to the rising main of main pumping engines, the exhaust water being returned to the pumps. The economical quality of the Cornish pumping-engine is considered to render this application peculiarly easy and good. But, of course, it could be used wherever rotary motion is required and water pressure is available. It is also adapted for use as a bilge pump, an hydraulic pressure pump forcing to accumulators, a fire engine, a hop sprayer, or a garden engine.

BAUER'S PATENT LINK SPANNER.

J. Gibb & Co., London.

Commended.

This tool consists of two parts, a long and a short arm, each provided at one end with suitable jaws; the other extremities are linked together by a hooked stud fitting into holes made for the purpose in the handle. The coarse adjustment is obtained by shifting the shorter arm from one hole to another, according to the size to be operated on; the fine adjustment then being obtained automatically as the shorter arm closes on the longer one, and the jaws are thus brought together. As soon as the jaws touch the work and pressure is applied they grip firmly, and the more the pressure the tighter the grip. This spanner can be instantly adapted to any variation of size, and is quite self-acting, as it grips the work by merely grasping the tool in the hand, and need not be alternately removed and replaced, since in the return motion for a fresh grip the spanner releases its hold. Round, square, or hexagon are gripped with equal facility.

ÆRATING FLOWER POT.

E. H. Clark, Starcross.

Recommended for Trial.

The object of this invention is to form a flower pot in which air may be supplied to the roots of plants contained therein, and also to do away with the shards or stones now required to be used. In the sides or circumference of an ordinarily constructed flower pot two or more apertures, more or less opposite one another, are made, and through these apertures are inserted a hollow tube or tubes, perforated by holes for the passage of air, vapour, or heat. These tubes are placed across the flower pot, having each end resting in, or passing through one of the apertures. The air passes through the apertures and thence through the air tubes, percolating through the holes, and thus reaching the roots of the plant. To increase root action in delicate plants, heat may be conveyed through these tubes either by means of the bath, or by plunging in heating material.

MODEL OF PULVERIZER.

Henry Broad, Breage.

£1 for Labour.

This was a well-made wooden model of a pulverizer, intended to be used also as an amalgamator for silver and gold ore, and as a mixing machine. It consists, in the first place, of a pan, 10 feet in diameter, or any other suitable dimensions, and constructed of hard stone or cast-iron. On and in this revolves a four-armed horizontal wheel, operated by cogs on its outer edge. To each of the arms is attached a small cogged wheel, made to revolve as the main wheel goes round by a central fixed cogged disc. To each of the smaller wheels four grinders are attached by chains, the grinders being made of iron or steel, or of iron shod with steel. The machine would be fed by any of the ordinary methods.

The advantages claimed are "the large and constant area of grinding, together with the rapid and thorough spreading out of the ore under the grinders, thereby effecting rapid and effectual pulverization of ore; also of quick and thorough mixing."

STEPHENS AND RODDA'S PATENT PULVERIZER.

J. T. Toy, Helston.

This apparatus is unlike any other arrangement that has been seen at the Polytechnic. Its special object is that of the further reduction of burnt leavings and other fine materials. It consists of an inclined plane, the angle of which can be arranged as required. This plane is cut up by grooves and holes, the latter being central, and the former arranged at an angle on either side: and these, of course, if clear, prevent the rapid passage of the material treated down the plane. On the surface of this bed there work a series of shoes, secured by bolts to an iron strap, which receives a to-and-fro motion from a crank or pin, fixed in a disc wheel. The special point claimed is that, by the prevention of the accumulation of water, the material is compelled to pass between the shoe and the rubbing bed, instead of being, from its lightness, floated away without passing under the grinding surface.

THE BARROW ROCK DRILL.

Loam and Son, Liskeard.

The "Barrow" was shown in its latest form. The chief improvements effected are in the twist. The borer is fitted with the automatic twist, and also with a hand twist brought as near to the automatic as possible, giving the man full power over the tool, and guarding against the occurrence of "fitchering." The ratchet is, of course, done away with. The cylinder and piston are now so arranged that the most careless workman cannot strike the end of the cylinder with the piston. There is likewise an improvement in the clipping of the jumper, a collar coming down and tightening with the first blow.

THE "CLIMAX" DRILL.

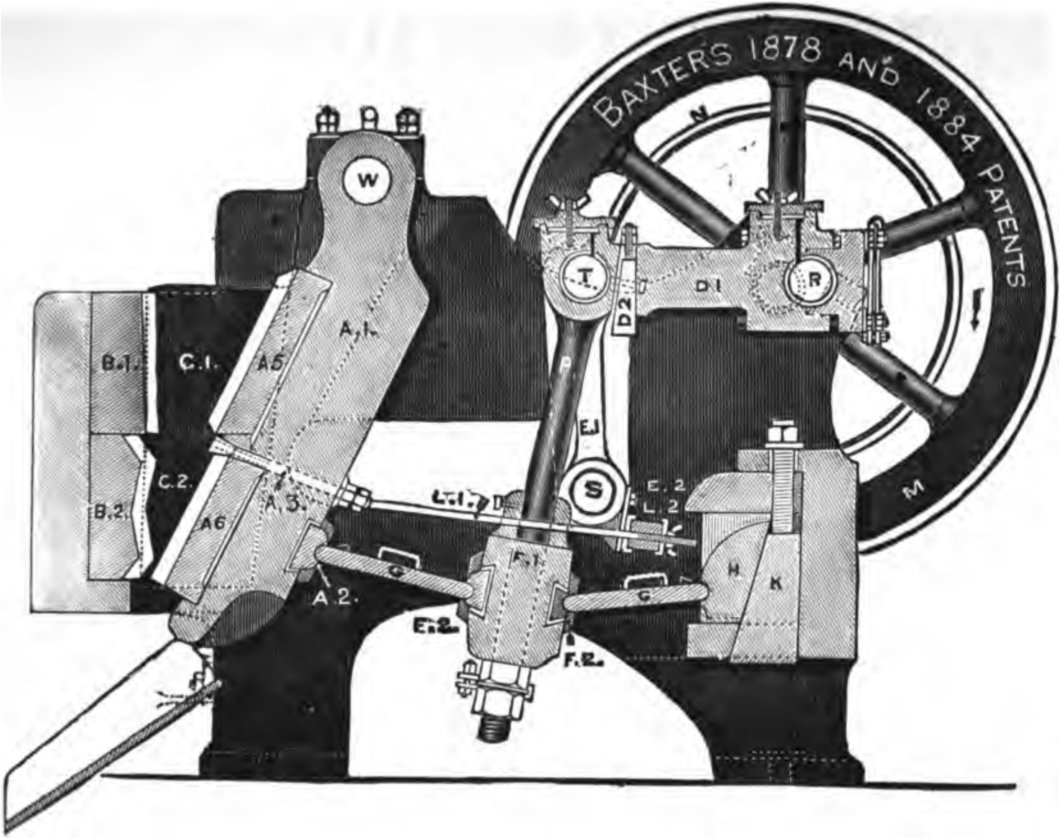
R. STEPHENS AND SON, CARN BREA.

This drill has been improved in several particulars since it was last exhibited before the Society. The air is now taken direct from the bottom of the passage, and a double conical bolt is used in working the slide valve, which is found to possess great advantages over the flat-headed bolt in use before.

KNAPPING-MOTION STONE-BREAKING AND ORE-CRUSHING MACHINE.

BAXTER & CO., LEEDS.

This machine was shown in a beautifully finished model. In giving the "knapping" motion the movement of the jaw is as follows: to move the crank, commencing with the forward movement of the jaw, the first quarter of a revolution of the fly wheel, the jaw moves three-quarters of its forward movement, the second quarter it moves the remaining quarter, the third quarter the jaw returns one quarter of its move, and the completion or last quarter of the revolution it gives the remaining three-quarters of its movement, so that the finish of the backward and the commencement of the forward movement is much quicker at this half the revolution than the other, being as much quicker as three is to one. The movement of the jaw can be regulated to suit any kind of material, and as a soft or tough stone requires a longer stroke than a hard or brittle stone, this is of essential importance. The "knapping" action is regarded as requiring less power, and producing a better sample for road metal, with less waste in chippings, while in fine crushing the irregular movement prevents the material from sticking to the jaws.


BAXTER'S 1878 AND 1884 PATENTS
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MACHINE FOR SEPARATING IRON FROM OTHER SUBSTANCES.

ERNEST SCOTT & CO., NEWCASTLE-ON-TYNE.

This apparatus was illustrated by drawings. The principle of action is the separation of iron from other substances by the rapid and automatic magnetisation and demagnetisation of a series of possible magnets. The mixed material to be treated is fed into a hopper, from which it falls upon an endless belt, by means of which it is conveyed under a revolving disc containing a number of electro-magnets, that, while never coming into actual contact with the mixed substances, abstract the iron and carry it away, while the non-magnetic substances, whatever they may be, are deposited by the endless belt in a hopper or any suitable receptacle. The iron is removed from the electro-magnets in the following simple manner:—On the upper portion of the spindle carrying the disc in which the possible electro-magnets are contained, a commutator is fixed, and so devised that contact is made at a point which ensures that the electro-magnets are energised while passing over the belt carrying the mixed material; while it is broken and they are demagnetised as soon as they have passed over it, and the iron collected then falls by gravity into any receptacle which may be placed to receive it.

SELF-GOVERNING DUPLEX TURBINE.

A. & H. WILLIAMS, WINCHESTER.

This improved turbine consists of the usual revolving wheel with curved blades, but is divided in the centre and has a top and bottom outlet for the water, by which the required increase of depth is obtained without impairing the egress of the water. The wheel is fitted inside an annular guide case, provided with stationary guide blades, which direct the inflowing water against the blades of the wheel. These stationary guide blades are fitted with wedge-shaped tongues, which, when open, lie in a recess in the guide blades. The tongues have a small shaft passing through the case above mentioned. The shafts are fitted with arms, which are connected together by a ring, so that in the event of one tongue moving, all of them move in the same direction. The ring is controlled by a weight or spring, which always tends to keep the tongues closed.

When part of the load is taken off the turbine the wheel commences to rotate at a higher speed. The centrifugal action of the water in the wheel re-acting on the inflowing water, reduces the pressure on the face of the tongues, so that they will be at once partially closed by the counterbalancing weight acting through the ring and arms before-mentioned. But as soon as the speed of the wheel is reduced the centrifugal action ceases, and the pressure of the incoming water being restored, the tongues return to their seats.

Messrs. Williams also exhibited admirably arranged and made examples of their hydraulic rams and their throw pumps.

BREAK OF GAUGE APPLIANCE.

S. R. Hawke, Hayle.

This is intended to supply a ready means of overcoming the difficulty of a variation of railway gauge, by dispensing with the necessity of transhipping freight from one truck to another, the truck being made to accommodate itself to the change of gauge. This is effected by so constructing the axles that the wheels may contract or expand as required.

The change of gauge is produced by means of a changing table, which is fixed into a pit at the break or junction, thus forming a connection between the broad and narrow. On changing from broad to narrow gauge, the trucks are run on to the table, the wheels being unlocked by turning the locking spindle to an angle of 90 degrees. Raising a small catch, the table becomes depressed by the weight of the truck, causing the rail cheeks with the rails to contract (by the radial action of the levers), and at the same time contracting the wheels. The change of gauge is thus effected automatically. The wheels are then again locked, and the truck run off. On again raising a catch the table is raised to its original position by a counterpoise ready to receive the next truck. In changing from narrow to broad gauge a second table is necessary, having the levers reversed, so that in depressing the table the rails will expand.

PATENT EYELETTED BUNG BUSH AND TOOLS.

R. W. Taylor, Bury-St.-Edmunds.

The bushes in this arrangement are made of the best malleable brass, which admits of ready and frequent expansion; and they are fixed in the stands or casks where required, on the principle of the eyelet. One of the tools bores the holes the exact size for the bushes, and the other clinches the bushes in their places. It is claimed that these bushes are much cheaper than cast brass, and that they can be applied to casks or staves by a boy.

THE LABBEZ TELEMETER.

J. H. Steward, London.

This is a remarkably simple and portable range finder and surveying instrument, by means of which distances can be found with great rapidity and approximate accuracy, as a single observer can make an estimate in about 30 seconds, or, with the assistance of some one to "dress" the observer with the object, in from 15 to 20 seconds. The instrument consists of a cylinder 1¾-in. long by 1-inch in diameter, containing two reflecting planes set at an angle of 45° and giving by reflection 90°. These planes can be moved through a certain arc by revolving a cam-piece at the end, which acts upon a pin fixed to one of the mirrors. An adjustment for the other mirror is provided in a cogged-head screw. This cogged wheel and the scale being set at zero, the observer who wishes to find the distance of an object looks about for something which will serve as a "mark," and be as nearly as possible at right angles to the object. Then he looks through the small hole and turns the cogged wheel until the image of the object is superimposed on that of the mark. Next he walks in a straight line 30 yards towards the mark, and having been "dressed" into line with that, again looks through the instrument and rotates the end of the cylinder until the object is reflected over the mark. The line opposite the fixed zero on the scale will indicate the reading of the distance of the object in yards without any calculation.

SAFETY CATCH FOR COLLIERY CAGES.

W. & T. Brown, Little Hulton.

This apparatus is planned to come into action directly the cage, &c., falls away, and operates by gripping the guides. The gripping levers are provided with arms fitted with rollers, grooved when wire guides are used, and left plain for wooden. The levers work on the sides of the cage on centre pins, and are connected at their ends with rods, which are joined together by a pin passing through a link of the winding-rope. The weight of the cage is supported under ordinary circumstances by the pin sliding to the top of the slot; but when the rope breaks the levers drop, and the arms are forced by the combined weight of the cage and the action of springs into an inclined plane, causing the rollers to take their grip of the guides simultaneously on the same horizontal line. The Judges did not think this equal to the Bennet catch, which itself had not been thought to meet the wants of Cornish mines.

PATENT UNIVERSAL JOINT.

W. G. Edmonds, Devonport.

This is a remarkably ingenious device, the special features of which cannot be described in detail without the aid of illustrations, but which consist in the construction and arrangement of a sectional concave bearing, a circumferentially grooved ball engaging the bearing, and pivoted clutched devices extending from the concave bearing to engage the groove of the ball. Mr. Edmonds suggests that the invention can be applied to screw shafting on board vessels to take off the strain from the engines, especially where long lengths of shafting are used; and for carrying lines of shafting for telegraph gear, where it is impossible to place wheels; also for braces it would be valuable, as it would enable persons to bore holes in very intricate places.

SOME FACTS IN THE LIFE HISTORY OF THE POLLOCK,*

AS SEEN OFF THE COAST OF CORNWALL.

BY MATTHIAS DUNN,
MEVAGISSEY.

Second Silver Medal.

GENERAL REMARKS.

When full-grown, Pollock have very decided and peculiar traits, apparently combining in one fish the habits of more than one of the *Gadiæ;* sometimes showing all the intense love of locality of the Bib, and at another evincing all the wild and roving disposition of the Hake. Thus for months together in the spring and summer months Pollock generally live in a uniform hunt-and-rest life, congregating by day around the rocky ledges of the sea bottom near the deepest water, circling around a certain spot, and often in such numbers as to appear like a living column standing in the sea. At such times these creatures seem to be resting or sleeping (as most fish sleep), probably with one half or more of their senses and functions of the body really at rest. When in this state Pollock will not attack or prey on the smaller fishes, unless they come very near or within the circle.

With the night the scene changes; then, thoroughly awake, every Pollock leaves the circle, and, hungry and ravenous, each steals away to hunt on his own account. But few living fishes come amiss to their stomachs. With the morning light all again return to their old haunts.

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* I use the names of fish as given by Couch.

In the autumn of the year this systematic life may be broken up at any time by the passing near to the reef of a school of Sprats, Pilchards, or Anchovies. The sight of these fishes calls out all the wolfish propensities of the Pollock, and each and all steal away after them, leaving the ledge and its associations, probably for ever, to dart and gorge on these little ones.

The autumn migrations of the Pilchard are grand times with these Pollock. Then almost every circle on the coast is broken up, especially these undisturbed haunts around the Land's End and Scilly Isles, and they continue to follow the shoals along the coast, and often far up the English Channel, keeping to the high ground when wanting rest, but always with their eyes on the object of their pursuit, and seldom taking to settled life again until sometime after spawning in March.

When catching prey the habits of the Pollock are to sneak along quietly until within darting distance of their object; then calling into use all their powerful fins, they dart like arrows on their victims. This is also their habit in taking the bait. There is no coaxing or waiting on the part of the fisherman for them to swallow it, as with the Hake or Conger; the act is, as a rule, a rush, like the Salmon taking the fly.

As to the question of the food of the Pollock being swallowed head or tail first, I think that all dead and wounded fish will be taken into the stomach as they are found, but that all live food is swallowed head foremost—those not caught in this form being turned in the mouth. There is more readiness of manipulation in the mouth of a fish than is generally supposed. I have seen Pollock stop short in their dart at food, and play it in and out of their mouths, as if tasting it, and finally leaving it; such food being either stale or sodden with water. The great reason why the Pollock swallows live food head downward is that they do not bite or tear their food in pieces like the carnivora, but simply swallow it alive, often without a scratch. If the head were upwards in the stomach no doubt the little fellows would force their way out again when the Pollock were in the act of securing other prey. How long they remain alive in the stomach of the larger *Gadiæ* (for these all take their food in the same manner) it is difficult to say. I have known Pollock drawn up from eighty feet of water and taken into the boat and killed, and on being opened I have seen pilchards and herrings taken alive from their stomachs. These fishes must have been secured and swallowed sometime before the Pollock took the fatal bait.

Young Pollock do not take to circling until above four pounds weight, and probably in the third year of their existence. Before that time they may be found on any rocky bottom, but more especially where the ground is very rough near the shore.

When shoals of Sprats or Launces appear the Pollock will congregate also in shoals, and, with a rush, attack the little innocents. An evening rout once seen will seldom be forgotten, for they will dart against the sides of a boat, if in the line of their attack, when on their hungry errand.

INTELLIGENCE.

This may be noted in Pollock early in life. When about four months old, before taking the bait they may be often seen to put their lips against the line, and in this manner to swim along and trace it up to the surface of the sea; thus by their actions saying, "It is a nice joint, but I fear some evil through its being attached to this line; let me see where it leads;" and such seem to be their conclusions that, although returning to the bait, they are seldom caught after tracing the line.

Again, it has been found on some of the extensive ledges off our coasts that all Pollock do not concentrate on one spot, but that several circles may be found on one ledge. That each of the fishes in these circles has a knowledge of locality and of its own haunt, may be learnt from the fact that our practical fisherman, in some instances, knows where all these circles may be found, and will fish on the best of them when it suits his purpose; and although he may catch all the fish in one circle, and days may pass between his fishing on the other parts of the reef, it will be found this has in no way lessened the numbers living in the other circles. Although the fish, being night feeders, must of necessity when hunting the ledge have passed by and over this depopulated haunt, the associations of their old home are too strong for them to think of another and a better one.

COLOURS.

Many fishes have the power of altering the colours of their skins, and adapting themselves to the nature of the ground on which they are living. This is noted in the Pollock. Those living on the reefs where the long dark laminaria seaweeds abound will be found to be of a dark olive, varying very little from the colour of the weeds; while those found in deeper water, where the rocks are lighter, will be very much of the same colour. This power is also seen in young Pollock, which, when food is scarce, will entirely leave the rocky and weedy sea bottom, and hover around the brown sands in which the Sand Launce takes up his night quarters. It will be then seen that these Pollock are quite brown in colour; in fact, are the very shade of the sand over which they have been swimming.

VARIETIES.

Near shore in the spring months of the year may be found the little red Pollock. These have a decided tinge of red in the fins, and sometimes streaks of red running down through the olive of the belly; while others will have a dark orange colour along the sides and belly, mottled with blue spots and streaks. Dr. Couch, in his "British Fishes," remarks on small Pollock having bright orange colours on their sides, caused by living in the shelter of the rocks clothed with seaweeds. But these red colours can scarcely arise from this cause, seeing that in No. 1

bottle* three of these little ones had a decided tinge of red on them when caught, and these were had from the surface of the sea, not having taken to the habitat of the rocks. I have seen Pollock as much as seven pounds weight with the red tinge in the fins and with the red markings running down their sides.

SUMMER AND WINTER DRESS.

This is a coating of transparent mucus, which envelopes the whole fish; for summer it is reduced to a very thin film; with the winter it increases to more than the sixteenth of an inch in thickness, and no doubt enables the fish to live in comfort off our shores in cold weather.

DISEASES.

These seem to be very few in the Pollock. One form is the wasting of the liver, caused by the boring through it of the worm parasite, *Filaria piscium*. Another disease is like that which is so common to the Cod, Bream, Mackerel, and Gar-fish, viz., curvature of the spine. Pollock affected with this disease seldom reach five pounds in weight, while full-grown, well-fed fish have been known to attain to twenty-four pounds.

PARASITES.

Very few of these are found on the Pollock, probably from their living so near to suitable places for scraping them off; the large and close-standing stems of some varieties of the olive seaweeds, and the projecting points of the rocky precipices of the sea, present admirable conditions for this purpose. A very common expression with young fisher boys, when fishing for young Pollock near shore in clear water and expecting a bite, is, "Look out, I saw a Pollock turn bright side up." The idea conveyed is that a Pollock is close by, and may be expected to take the bait. And this turning "bright side up," which they often do, by scraping their backs along the weeds and rocks, is no doubt the act of raking off the parasites. I only know three parasites common to this species—the *Lepeoptheirus*; the young of a sessile-eyed Crustacean belonging to a species of *Cirolana* (the latter is also found in great numbers on the Red Mullet); and third, the same as that which made such sad havoc among the Mackerel last year, *Filaria piscium*—these were to be found in the cavity of the belly.

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* The paper was illustrated by a series of specimens in bottles.

ENEMIES.

Gulls and Gullimots destroy immense quantities of Pollock when they are very young, just after being hatched. When under a month old they live on the surface of the sea, keeping close to all kinds of floating *débris*. At such times these sea birds scarcely ever leave them. Porpoises also often attack all sizes of the species. It is nothing uncommon in clear water close to shore to see the Porpoises dart along the sides of the rocks and devour them.

In the summer of 1878, when the fishing boat "F.H.," of Mevagissey, was passing over the high ledges off the Gribben Head, Cornwall, the crew saw a shoal of Porpoises attack a circle of large Pollock, killing scores of them. They tacked the boat, and took up quantities of large fish, the violent beasts having destroyed more than they could eat. The acts of Porpoises when feeding on them are very savage. Sometimes when going at full speed a Porpoise will seize a Pollock and play with it, as a cat will with a mouse, and by some power unknown to me throw it three or four feet out of the water forward, the next instant catching it again in its jaws. I have known this done four or five times in succession with a Pollock of about three pounds weight. A Porpoise will sometimes seize a large Pollock by the middle with his powerful jaws, and other Porpoises will swim around and eat the poor victim alive from the mouth of the holder.

CAPTURE.

These brutal creatures no doubt are the cause of the skulking habits of the Pollock, so annoying to the amateur fisherman; for this fish when hooked will, if possible, rush away from his enemies in among the large laminaria seaweeds, or into some sheltered hole in the rocky sea bottom, so that the amateur fisherman with his fine gear is often unable to draw him out. Our fishermen, when after large Pollock, go in the day-time where the fish are circling. The crew consists of two men, each provided with sixty fathoms three-quarter pound lines, with snooding six feet long. One of these is used without a sinker, the other with it. The lines used in this way will cover a greater amount of ground than any other from a stationary boat, and thus enable the fishermen to correct any slight error made in anchoring on the circling ground, as it is impossible to be successful in fishing by day unless the baits go right into the circle.

The baits should be Mackerel, Pilchards, Cuttles, or young Bream.

A fisherman can always tell the kind of fish he has to his line by its actions on the hook. Every fish has its own peculiar action: thus the Pollock when hooked starts off at a sharp angle for the sea bottom, and if prevented from reaching it, will then try to get away by force, and acts very much like a flying kite on being pulled to the ground. The fishermen call it "shearing about." After failing to free itself by this mode, it suddenly turns and darts towards the boat, at the same time disgorging the contents of its stomach by turning it inside out, hoping by these means to clear out the hook. The actions of the Pollock throughout the capture will be the one or the other of these tactics.

For small Pollock the most successful plan of capture is whiffing. This operation is carried on by two men: one rowing a small boat about two miles an hour; the other attending to one or two lines towed without sinkers over the stern. The baits should be a thin slice cut from the tail of a Mackerel, Pilchard, worms from the sea beach, small eels, or artificial baits, as supplied by Hearder or Brooks, of Plymouth. The most successful whiffer I ever knew fished with an angling rod over the quarter of the boat with the line weighted, the snooding entirely of catgut, and with artificial baits. These little fish are also often caught in trammels, ground nets, and seines, when used for Mackerel and Red Mullet. Pollock a few months old will rise to the fly.

BREEDING.

In many fishes the procreative instincts are active some months before actual spawning commences, as in the Herring and Pilchard. This is noted under two aspects. The first is extreme restlessness and change of locality, until a suitable spawning ground is found. The other—when satisfied they have chosen the right place—is a state of great quietude, and only the taking of such food as will keep the body in its normal condition. One or more of these phases of life may be seen in more than one species of fish.

We can scarcely trace the former in the Pollock, but we believe we can the latter. For although so active and voracious in the autumn, but little is seen of them in February and March, although from long observation we are certain March is the general time of these fish spawning off our coasts. That they are then living not far from land may be concluded from the fact that they may be found only a few miles off the coast in April, thin and hungry; while about the middle of the same month young Pollock, just escaped from the egg, may be seen on the surface of the sea, close to land. That the eggs float on the surface of the sea when shed seems probable, seeing that the liver of a full grown Pollock is very large, and contains several ounces of oil, all of which escapes among the eggs at the time of spawning, and no doubt helps to float them. It is also a fact that the oil leaves the liver of all the fish of the species at the time of spawning. Like all the *Gadiæ*, the Pollock carries a large number of eggs. I have found as many as four million in the roe of a Pollock twelve pounds weight. The time the eggs take incubating cannot be stated with precision; but considering the fifteenth of March as the average date of the parent spawning, I have often seen young Pollock of a half-inch in length from the fifteenth to the twentieth of April, which could not be more than from ten to fifteen days old. This will give the period of incubation from fourteen to eighteen days.

On the matter of spawning and incubation of fishes there is much to be said. Scientists tell us that the spawning of salmon in the British Isles continues from September to January, and that the Herring may be found breeding off our shores in every month of the year. But this statement requires qualification; for although generally true, the facts do not apply to every coast, since each distinct locality has its own especial time; thus it will be found that Herrings are always in spawn off Plymouth about the first of January, whereas at Mevagissey the great Atlantic Herrings do not spawn until the tenth of March. Possibly future researches may show that on other coasts the Pollock may spawn at some different time.

GROWTH.

On this subject I must refer to my specimens.

No. 1 bottle contains several young Pollock, from a half-inch to an inch long. These were caught in Mevagissey Bay, on May 4th, about fifty yards from land, on the surface of the sea, close to some floating seaweeds. It can be seen that the colours of the fish are not yet diffused through the skin, but are held in spots and stars (pigment cells) either in or under it; that the fins are all white and transparent; and that no scales are found on them when under three quarters of an inch in length. The largest are just an inch long, and two grains in weight. I estimate them to be about a month old.

No. 2 contains young Pollock caught near the same place, close to the bottom of the sea, on June 3rd; taking the average of two of the largest, it will give a Pollock one inch and three-quarters long and eleven grains in weight. It will now be observed that they have all their fins and colours perfect, and are fairly on the line of living as the parent fishes. These I estimate to be two months old.

No. 3 contains young Pollock caught the same place as above, July 6th. The two largest will give an average fish of three inches long and sixty grains in weight, and estimated at three months old.

No. 4 contains young Pollock from the same place, caught August 14th. These two will give an average length for one fish of five inches, and 225 grains in weight, and are estimated to be four months old.

No. 5 bottle has two young Pollock caught at Mevagissey on the 25th of September, 1884. Each fish will average five inches and six-eighths in length, and 362 grains in weight. These are probably a little over five months old.

I give these lengths and weights with the greatest confidence, knowing they represent the monthly growth of the first Pollock which reached the shores around Mevagissey for the year 1885, and also, with very little change, in the same months for ten years past. These little creatures are as familiar to me as barn door fowls are to the farmer. The figures show the increase in four months to be one hundred times their original weight.

I may here state that throughout my observations on these little fishes I have kept to those which first reach the shore, and these, throughout the season, as a rule, are the largest. Some young Pollock do not float in for two or three weeks after the first, probably through contrary winds and tides or later spawning; hence these will be behind the earlier examples in growth and condition throughout the season. Besides this, there are the accidents of food, health, and other conditions, which keep some of the season's fish back to less than five inches in length up to November, and after this, like the Mackerel and Red Mullet, there is but little, if any, growth among the young Pollock until the following May. In further tracing their growth it will be seen that the summer is the time of their greatest development, and that some will reach maturity in the third and others in the fourth year of life.

ON THE STORAGE AND TRANSMISSION OF TIDAL-ENERGY.

J. Q. DUNSTAN, FALMOUTH.

First Bronze Medal.

The honour of deducing the corollary that "the original source of the power of heat engines is the sun" has been attributed to George Stephenson, and its general truth is now admitted to be incontestable. With equal truth it may be stated that the proximate cause of tidal-energy is the moon, acting chiefly through gravitation; although here too the sun is not without his influence.

Doubtless persons dwelling on the coasts of all parts of the civilized world, where tides operate, have from remote times been struck with ideas, more or less vague, of the possibility and desirability of utilizing this great natural source of constantly-recurring energy, and directing it to the more immediate wants of man. That ideas of this kind have drifted down the streams of time from very remote ages cannot be doubted. The concurrent testimony of many ancient writers proves that the Romans, so early as the fifth or sixth century, constructed tide mills on the Tiber; but these probably depended more on the natural current of the river than tidal-energy, local influences reducing the rise and fall there to a very small amount.

But the French are generally admitted to be the inventors of the modern tide-mill, properly so-called, and Belidor ascribes the invention to one Perse, a master carpenter of Dunkirk. The origin of tide-mills in this country does not appear to have been recorded. They have never been very common, nor, from an engineering point of view, very important, with perhaps the one or two exceptions hereafter described. One reason of this is not far to seek: the great expense of construction, viewed as an individual enterprise (as it would be before the days of joint stock companies and the combination of capital), barred their adoption to anything like a general extent.

But when we consider the gigantic enterprise of this utilitarian age, it is an astounding and not very creditable fact that a great tidal stream ebbs and flows twice every day before our very doors, and that yet no effort worthy of the name should have been made to turn it into useful work. It would be a matter fraught with great difficulty to wholly account for this state of things; but probably enterprise has been paralyzed to some extent by the prevalence of erroneous popular ideas on the matter, to the effect that all future development and utilization will be contemporary with the bringing to light some preternatural piece of ingenuity in connection therewith — not till then; and the advent of which many are complacently and confidently awaiting.

But the truth is, the writer submits, that we now have all the elements of success with us, and all the necessary conditions surrounding us, overlooked probably from their very obviousness: so little heeded, indeed, that like the potent weed in Comus, "the dull clown treads on it daily with his clouted shoon."

Perpetual motion—that 'Will o' the Wisp' so eagerly sought in various guises by restless and uninformed spirits—is here to our hands in its only possible form, and, like the mythical giant, need only be caught and harnessed to labour for us unceasingly and uncomplainingly.

To bring this more clearly home to such as have not given the question their particular attention already, an illustration will be useful; and for this purpose it will be necessary to introduce a few very elementary figures.

Take the case of Falmouth Harbour, the water area of which is, in round numbers, 10 square miles, or 6,390 acres, or 278,348,400 square feet. If we take the mean rise and fall as 15 feet, the height of the centre of gravity of this weight of water will be 7·5 feet. We then have

$$\frac{278{,}348{,}400 \times 15 \times 62{\cdot}5 \times 7{\cdot}5}{12{\cdot}5 \times 60 \times 33{,}000} = 79{,}076 \text{ H.P.}$$

Now this enormous power represents the work done per tide in Falmouth Harbour alone. Try and carry your imagination into all the creeks and harbours of Great Britain, with her enormous coast-line, and conceive, if you can, of the energies running riot on our own shores alone, and positively wasted as far as the advancement of social economics are concerned.

I propose to enumerate a few of the typical schemes that have from time to time been proposed. But I am not aware of many of them having been carried into practice, with the exception, perhaps, of a few of the mill or turbine class, which have in many cases been assisted by steam. A noteworthy example of water-mill was erected many years ago at East Greenwich on the Thames, a description and plate of which will be found in the *Encyclopædia Metropolitana* for 1834. It appeared to be a very elaborately designed affair, so arranged as to give a constant immersion of float, and the floats arranged differentially on various wheels on the same axis. It is the only really noteworthy example, as far as the writer is aware, that ever existed in this country, and was employed in grinding corn on the spot.

Incidentally it may be mentioned that a system of undershot wheels was actually erected between the arches of Old London Bridge, operating pumps for the early London water supply. The arches of the Bridge were leased one by one for this purpose, until the centre one alone remained for the passage of craft. But the rapidly-increasing demand both for water and an improved means of transit eventually rendered their removal necessary.

A familiar illustration of a simple form of tide-mill was at work some years ago at the Bar, Falmouth, and must be within the recollection of many persons.

The writer takes this opportunity of stating that he makes no pretence of offering anything like a complete resumé of the subject: but if he succeeds in directing more thought to the subject, which has never hitherto, he thinks, received the attention its importance merits, his object in bringing the matter before this Society will have been attained.

In the following examples, for the sake of lucidity, I have discarded the obsolete spelling, and I commence with the latter part of the seventeenth century.

A.D. 1693. John Hadley:—"An invention whereby a motive power or faculty is obtained from the ebbing and flowing of the tide, operating on a vessel floating thereon, which said vessel, by its rising and falling with the water, gives motion to all manner of movements, as mills, engines, etc.; an invention of horizontal wheels or engines to move in or under the water by the water, or out of the water by wind, differently framed as the work may require; an invention of letting down all sorts of wheels of common use, rendering them thereby more useful in uncertain waters by rightly taking the stream at all heights of the water; an invention of engines moved by wind, useful for drawing several machines or carriages, instead of by horses. A contrivance of measuring time—a more compendious way, with one wheel only, which will go much more exact than movements with multiplicity of wheels—which will be of very great use and advantage both by sea and by land."

It has been said that there is nothing so vague as a modern patent specification—alluding to the amateur work inaugurated by the new act; but if there be anything more vague, possibly it will be found amongst the earliest specifications: witness the preceding as an instance which seems to deal in generalities and universal claims. Here we have in one specification a tide-mill, a wind-mill, and possibly a clepsydra or water-clock.

A.D. 1724. Richard Dunning:—"Two engines or machines—one a water engine for raising or forcing water up into any town or gentleman's seat, which may properly be called a floating water engine, to be placed or fitted on a barge in the river of Thames or any other large river, without hindering the navigation of the river; and is movable at pleasure, and which will be wrought by the force of the coming in or going out of the tide, or with the current of river where no tide is; and will force the water from the middle of the stream about one foot below the surface of the water, by which means the water will be clearer and finer than at the sides or near the bottom, which the petitioner humbly presumes will be of great advantage and service to the public."

Nearly the whole of the earlier inventors made all sorts of utterly dissimilar claims in one and the same specification. Dunning, for instance, goes on to describe a wheel for propelling ships or vessels, whereby they may be propelled at the extraordinary speed of sixty miles per day. But I shall confine myself to such portions only of the following specifications as are relevant to the matter in hand.

A.D. 1752. Edward Coleman:—"The machine when worked by water is a water-mill or wheel with spooners, wallows, and spur wheels, one or two of which may be placed in a barge which hath a well and bridge, through which the tide or current runs, which works the machine. The wheels to be used for raising water are hollow, taking up the water in a semi-circular or spiral form, and having in them fixed receivers; and sometimes move with swivels; may be worked with a cog-wheel, rope, or chain, either by wind, horse, or water."

A.D. 1774. Joseph Jackson describes the ordinary water-wheel, and goes on to describe the method of conveying the water to and from the wheel:—"To convey the water to and from the wheel is to have two revisers of equal size, one to receive the water at high tide by a sluice, the other to receive the water from the wheel and discharge it at low tide; to divide the flowing and ebbing of the tide into three parts. That is to say, when the tide flows fifteen feet high, five feet for the upper reviser and five feet for the fall in the wheel, and five feet for the lower reviser. And so by taking in a proper quantity of high water to carry the wheel, and by discharging it at low water from the lodge below the wheel, the wheel is in constant motion, and never stands but at the manager's pleasure.

A.D. 1800. William Johnson:—"Consists in a water-wheel placed in a channel, having a water-gate at each side; the whole constructed that they may be raised or lowered with the increase or decrease of the water, together or separate, and being adapted to render the water, when entering into a basin from the rising of the tides, equally powerful as the falling of the water from such reservoir when the tide has ebbed; and by means of a surplus power of water, more than immediately necessary for the manufactory, being admitted to act on the water-wheel, a power may be acquired and employed during the turning of the tide to give the machine perpetual motion and power."

This man seems to have had the first light on the possibility of storing or conserving tidal force.

A.D. 1839. Robert Copland's is an improvement in floating tidal-wheels, and seems to be a sort of turbine. "In place of having the float-boards at right angles to the stream and parallel to the axis of the wheels, I arrange the shaft or axis parallel, or nearly so, to the stream, and the diameter of wheel at right angles, or nearly so, to stream, and the float boards I place at an angle to the stream. In employing these wheels they may be wholly or partly immersed."

A.D. 1841. In the *Surveyor, Engineer, and Architect*, for this year, one Samuel Laing proposes a very simple and ingenious tidal-wheel. The axis of the wheel is fixed vertically in a suitably constructed channel, open to flux and reflux of tide.

There is a bend formed in the water-way in such a manner that one half of the wheel is always kept out of the current whilst the other half is being acted upon. This wheel is to be submerged.

A.D. 1844. John Aitken :—" This invention relates first to working dredging machines for cleansing and deepening tide-ways or rivers, by means of power obtained from the tide. Secondly, to a mode of arranging machinery for lifting stone or other heavy bodies by means of a vacuum produced by displacing water. Thirdly, to a mode of traction on or in canals or other waters by means of atmospheric pressure acting into a partial vacuum, obtained by water. Fourthly, to a mode of loading or discharging ships by means of the power of the tide."

A.D. 1851. In the Polytechnic Society's Report for this year a description of a method of " raising water " by tidal action is described; and the author receives a prize from the Society for ingenuity. The description in the Report is a very short one, and it is difficult to say how far it may have differed from others of the same class. The general principle is an old one: to make the tidal action force air as a piston, elevating water by stages.

A.D. 1853. Penny and Rogers. This is a description of a tidal wheel with feathering floats, a well-known arrangement to avoid obliquity of action.

A.D. 1856. George Guillaume. This apparatus is styled an " Hydraulic Lever." It consists of a horizontal tube, with two or more arms extended therefrom, fitted with valves or flaps, catches, and connecting rods, chains, ropes, or wires, and with or without floats. The central tube is mounted on an axis, and having an inlet for water at one or both ends. It is furnished with horizontal arms, projected at right angles to the axis; these arms are furnished with inlet valves or openings, which admit the water alternately to opposite arms; they are also furnished with valves that release the water at the proper time.

A.D. 1859. Jules Sequin :—" Arranging three basins, which are filled by the influx of the tide, and in connection with which are the machines to be worked. The influx of water into and the outflow of water from these basins are regulated by sluices."

A.D. 1860. We are now come to a distinct departure; and although, perhaps, practically absurd, the "storage" idea is in it nevertheless, and it therefore points in the right direction. It is that of Quiricus Filopanti, and sets up an apparatus for "storing" up the motive power of cheap or costless forces, and carrying their useful effects where no such cheap or costless moving force could be applied. What follows is perfectly unique, and will well repay perusal. "The force is employed to wind one or more bandages of india-rubber around a cylinder, which is taken to the place where the power is required, and there allowed to unwind itself and become wound round another cylinder, but without tension."

A.D. 1862. Pierre Lucien Fontaine:—"Emptying or draining the water from careening docks, and utilization of tides for this purpose. A reservoir may be made near the dock, which is filled at high water. When the time for draining arrives the water contained in the reservoir is employed to actuate pumps to effect the necessary drainage."

The same year Henry Alfred Jowett took out a patent for compressing air by tidal wheels, transmitting the same, and measuring it. He winds up by making a very modest claim indeed—"I particularly claim the application of tidal rivers and a fall of water as a motive power."

But we see a distinct advance again here, *i.e.*, the idea of "transmitting" the power.

A.D. 1866. Thomas Woodward:—"Improvements in machinery for elevating sewage water and other liquid matters; also applicable as a means of affording motive power from water. A reservoir at a place exposed to tides, in which the sewage matter is to be stored. I place in the reservoir a double or reverse pair of archimedian screw tubes, set on an oblique shaft. Near the reservoir I place a barge, caissoon, or other body having considerable power of flotation or buoyancy, and yet of considerable weight. This may be placed in an archway or recess, and be secured by mooring chains. In the centre (like a mast) it supports a vertical shaft or toothed rack, which gears with a pinion, set on a shaft, containing a large toothed wheel, which in turn gears with a second pinion, and so on after the manner of multiplying gear, until the last toothed wheel gears with a pinion of the archimedian screw tubes, whereby the rise and fall of the caissoon gives a motion to the screws so as to raise the contents of the reservoir."

A.D. 1871. At the International Exhibition of 1871 a model of Tommasi's "Flux Motor" was exhibited. It consisted essentially of a receptacle formed under the bank or beach in close proximity to the sea, the bottom of the receptacle being about level with low water, and the top level with high water. Midway in its height it is divided by a diaphragm. The bottom division is connected directly with the sea by a pipe; and the upper division is connected to the lower. Its action is as follows: the tide rising partially fills the lower compartment and drives the air in a compressed state into the upper compartment, from whence it is used to drive a motor. On the tide falling the action is reversed, a partial vacuum being formed in the upper chamber, and the motor being connected with it is driven by the external air.

There have been many other patents of recent date bearing on the same subject, but the writer prefers to leave the advocacy of these to their respective projectors. Obviously to select a few and reject others would be invidious.

The whole of these schemes may be roughly classified into five generic groups, *i.e.*,

I. Wheels erected on shore.
II. Wheels erected afloat.
III. Floating Caissoons or Pontoons.

IV. Gravitating water as "Hydraulic Lever."
V. Atmospheric piston as "Flux Motor," or the "stage" processes of raising water.

Each of these groups is, of course, again subdivisible into other branches, but for the purposes of this paper such a refinement will not be necessary.

Of all the various methods herein touched upon the writer thinks the power of flotation, or supporting of bodies specifically lighter than the fluid in which such bodies are immersed is, on the whole, the best adapted for conveniently utilizing tidal energy; and, moreover, the adoption of such a method still leaves it possible to utilize separately the flux and reflux of the tide through the channel of the reservoir, for the purpose of driving a wheel or turbine; so that the excavated works necessary for enclosing pontoons of sufficient buoyancy may not only be utilized in lifting and lowering these pontoons; but the necessary flux and reflux of the water into and out of the the excavated spaces may be utilized on the well-known tidal wheel principle.

A comparatively small excavation could be made nicely to accommodate one or more ballasted pontoons, having a mean effective thrust and pull of say 10,000 tons. Now suppose this to be lifted and lowered 15 feet every 6 hours, or 60 feet per day, and for seven days of the week. We then have for 12 hours per day, and 6 days per week—

$$\frac{10,000 \times 2,240 \times (60+10)}{12 \times 60 \times 33,000} = 66 \text{ H.P.}$$

Sixty-six horse power! Sufficient of itself to drive a moderately large factory, working twelve hours per day for six days of the week, by simply resorting to the storage of all the tides of the week. But in addition to this we have the power gathered from the flux and reflux of the same water used in the floating of the pontoon. It would be difficult to calculate this with any approximation to accuracy on account of scarcity of data; but it cannot be doubted that the power would be considerable and well worth the trapping. Now how many pontoons of the above effective pull and thrust could be moored and worked in an area equal to, say the tidal harbour at Falmouth? Certainly enough to supply power to the whole of a large and busy manufacturing district.

To reiterate what has already been said, we have at our disposal by adopting this suppositious arrangement at least 66 H.P. for 12 hours per day and 6 days per week. The next question to be considered is how and in what form the energy may be best stored and transmitted. The fatal mistake hitherto made has been the bringing of the work to the power, instead of adopting the converse. If it be desired say to light a town or district, it may be turned directly into electricity. But if, as would most generally be the case, it is desired to distribute a handy power for general purposes, nothing will meet this purpose better than an hydraulic installation. Recent experience has shown the capabilities and economies of this, very greatly to the disadvantage of all other systems of gearing, belting, etc., which necessitates the running of a lot of shafting and belting, etc., whether work is being done with one machine or the whole set of a factory's machinery. Taking all things into consideration, the hydraulic system compares very favourably indeed with any of the pneumatic systems, a result that might have been expected, when it is borne in mind that the temperature of air under compression is raised, and thereby raises density. Now if this heat of compression is allowed to escape, as it must be if the work is any distance from the compressor, we have in it a great source of loss. On the other hand, if the exhausting system be adopted, and only atmospheric pressures used, large piston areas must be resorted to in order to develope power. Moreover, air [illegible] with punctuality, and [illegible] workmanship [illegible] notwithstanding this, [illegible] installation of [illegible]

[illegible] flow and ebb of [illegible] working Cornish [illegible] A [illegible] simple [illegible] direction, [illegible] it may [illegible] of the [illegible] work by [illegible] stroke.

[illegible] proposed [illegible] very distant [illegible] approach to [illegible] the writer [illegible] is simply

[illegible] of course, [illegible] many of [illegible] In some of the [illegible] the gain [illegible] machinery in [illegible] In the opinion [illegible] future, [illegible] energy on a [illegible] and works [illegible]

The Falmouth Observatory.

The Royal Cornwall Polytechnic Society's General Committee, appointed on the 4th April, 1883, an Observatory Committee, to obtain, if possible, a reversal of the decision come to by the Meteorological Council to discontinue the annual grant to the Falmouth Observatory, and subsequently to obtain funds for and erect a New Observatory, on a site approved of by the Meteorological Council.

This Committee consisted of Mr. Harry Tilly (Chairman), Rev. Canon Rogers, M.A., Rev. Wm. Rogers, M.A., Messrs. Robert Fox, Howard Fox, W. Slade Olver, John Stephens, R. M. Tweedy, A. Willmore, Wilson L. Fox, W. M. Grylls, and E. Kitto, Secretary.

They put themselves in communication with Dr. Balfour Stewart, F.R.S., and Dr. C. Le Neve Foster, F.G.S., through whom the arrangements for the establishment of this Observatory were originally made, and from them received valuable information.

The Committee prepared a statement of facts relative to the establishment of the Observatory, and to the character and utility of the work, &c., which was printed and distributed among the friends of the Polytechnic Society, whom it was thought could afford assistance, together with a circular letter inviting their co-operation by joining in a deputation to the Meteorological Council.

The statement was as follows:—

"FALMOUTH METEOROLOGICAL OBSERVATORY.

"The Falmouth Observatory is one of the seven Meteorological Observatories of the United Kingdom, established by the Meteorological Committee of the Royal Society in 1867, 'to give accurate data for a discussion of the law of storms and weather changes, and to ascertain meteorological constants, thereby performing with great precision for the land stations that which is accomplished with moderate precision by Branch I. for the entire ocean.'

"These seven Observatories are situated as follows :—

ENGLAND.	Kew. Falmouth. Stonyhurst.
SCOTLAND.	Aberdeen. Glasgow.
IRELAND.	Armagh. Valencia.

"These stations were considered by the Meteorological Committee to be 'as well distributed over the area of the British Isles as was compatible with the existence of an efficient local scientific superintendence,' Valencia being the only exception to local control, the Committee stating that in that case they had had to undertake the entire management.

"All these stations were in full operation by March, 1868, and have so continued to the present time, the results obtained from the self-recording instruments being of the greatest importance to the advancement of Meteorological Science, and procurable from no other quarters.

"The Meteorological Committee of the Royal Society (for whom the Meteorological Council are now substituted) in their report for 1870, speaking of certain deductions based on the wind records from the seven Observatories, and the extra Anemometrical stations, state that these station are far from sufficient to give information on the point, ar that the Meteorological Office is endeavouring, as fast as funds will allow, to increase the number of its Anemometrical stations.

"The Falmouth Observatory was started with the following self-recording instruments:—

"A Robinson Anemometer, which continuously records the velocity and direction of the wind.

"A Thermograph Instrument, which continuously records the temperature of the air and of evaporation.

"A Barograph Instrument, which continuously records the pressure of the air.

"A Self-recording (Beckley) Rain Gauge was added in April, 1871, and a Bright Sunshine Recorder in March, 1880.

"In addition there are the following Standard Instruments, from which observations are taken by the eye at least five times daily, which are used to check the automatic records—

"A Standard Barometer (Fortin).
" Dry Bulb Thermometer.
" Wet Bulb Thermometer.

And the following are read once every 24 hours—

"A Mercurial Maximum Thermometer.
"A Spirit Minimum Thermometer.

"The Royal Cornwall Polytechnic Society, under whose local care the Observatory was placed, has always shown a very lively interest in its success, and under the direction of a Special Committee of that body the work has been carried on without intermission since March, 1868, and to the satisfaction of the Meteorological Office. The instructions of that department, and of its inspectors who annually visit the Observatory, have always been strictly carried out, and the Polytechnic Society has had but one desire, viz., that everything should be done for the proper conduct and efficient working of the Observatory.

"The Polytechnic Society arranged for the erection of a special building for the requirements of the Observatory, the cost of which and of the different instruments, and their fixing, &c., amounted to about £1,000. The site for the building was approved of by Dr. Balfour Stewart, F.R.S., Secretary of the Meteorological Committee at that time, and the arrangements were authorised and sanctioned by that gentleman. The following resolution of the Meteorological Committee was transmitted to the Polytechnic Society on the 6th August, 1867. Resolved, 'That in consideration of the Polytechnic Institution of Falmouth having undertaken to erect a building suitable for the proposed Meteorological Observatory, the total annual allowance to them for Meteorological purposes (always dependent on the passing of the estimates) shall be £250, to commence from the time when the Observatory is in actual working order.'

"By the terms of this grant it will be noticed that the continuance of the annual allowance of £250 is made perpetual, subject only to the passing of the Parliamentary Estimates.

"The Parliamentary Vote to the Meteorological Committee was originally £10,000; was increased to £12,000 in 1878, to £14,500 in 1879, and to £15,000 in 1881.

"The annual grant to Falmouth Observatory was at first £265 (a sum of £15 being allowed in consideration of the extra expenses incurred for rent for the Observatory), was increased to £290 in 1878, and reduced to £250 in April, 1883.

"The geographical position of the Falmouth Observatory at the entrance of the English Channel—the great highway of our maritime commerce—and at the most southerly point of all the seven stations, being about 2 degrees south of

Valencia, and more than 7 degrees south of Aberdeen, is of the greatest importance as affording the most valuable data for tracing the course of storms (which so very frequently approach our shores from a southerly direction) and for the investigation of other Meteorological phenomena.

"The Anemometer is fixed on the top of the tower at a height from the ground of fifty-seven feet, so as to be free from local disturbing influences. In January, 1882, new shafts, staging, &c. for the Anemometer, were erected at a considerable cost to the Meteorological Council and the Society. No other self-registering Rain Gauge exists in the West of England, and no other Bright Sunshine Recorder is to be found in the County of Cornwall; the parapet of the Observatory building being admirably suited for this interesting Instrument.

"In addition to sending regularly to the Meteorological Office data, obtained from the instruments and from the eye observations as required, weather tables are—with the sanction of the Meteorological Council—published in the Plymouth and local papers; an elaborate chart and climatic tables are published annually in the Reports of the Royal Cornwall Polytechnic Society; data are furnished to any one applying for the same for the purposes of scientific inquiry; and as accurate and continuous wind records are of the utmost importance near the entrance of the Channel, information is supplied to persons interested in shipping, particularly for use in the Admiralty Courts in London and the provinces, and in cases of Board of Trade inquiries into shipping disasters at Falmouth and elsewhere.

"Whenever telegraphic communication with the Scilly Isles has been interrupted through a breach in the cable, so that it has been impossible for the Meteorological Office to receive daily weather telegrams from that reporting station, Falmouth Observatory has always been selected to supply weather information from the West. On one occasion the staff sent weather telegrams to the Meteorological Office three times daily for a period of over fourteen months (from February 13th, 1877, to April 20th, 1878).

"Having regard to the terms of the original resolution by which the grant was made, to the great value scientifically and commercially of the results obtained, to the large expenditure entailed at starting, and to the small annual cost, viz., £250, of its maintenance in full working order, compared with the Annual Grant to the Meteorological Office of £15,000, it is trusted that the Meteorological Council will reconsider this question, and will see their way to continue the grant to the Royal Cornwall Polytechnic Society for the Falmouth Observatory.

"*Falmouth, June, 1883.*"

In response to the circular many promises of co-operation were readily made, and several scientists expressed themselves in favour of the retention of Falmouth Observatory. Mr. Robert Fox, by personal calls, procured the interest and aid of several influential friends of the Society then in London, and gathered information of much value to the Committee. Subsequently, at the request of the Committee, he went to London, and made preliminary arrangements for a Deputation to wait on the Meteorological Council.

The Council finally agreed to receive the Deputation on Wednesday, the 27th of June, at 2.30 p.m.

The Secretary was instructed to proceed to London on the 23rd June, and Mr. Howard Fox, by special request, followed on the 25th; they called on as many Members of both Houses of Parliament, scientific men, and others interested in the Royal Cornwall Polytechnic Society, as possible, and on the 26th June the Secretary sent printed copies of the Memorial which the Committee had prepared for presentation to the Council, to those gentlemen who had been invited to join the Deputation, together with a circular reminding them of the time and place of meeting, and urging their attendance.

The Memorial was as follows:—

"Memorial OF THE ROYAL CORNWALL POLYTECHNIC SOCIETY TO THE METEOROLOGICAL COMMITTEE OF THE ROYAL SOCIETY.

"GENTLEMEN,

"Referring to your proposal to discontinue the Annual Grant to this Society for the maintenance of the Falmouth Observatory, communicated on the 21st February last, and to your consent (by letter of 17th April last) to receive a Deputation of this Society to urge a continuance of the Annual Grant, we beg very respectfully to submit the following reasons why, in our opinion, the Falmouth Observatory should continue to receive the Annual Grant for its maintenance in full working order.

"1. The terms on which the grant was originally made makes the annual allowance of £250 dependent only on the passing of the Parliamentary Estimates.

"2. The small annual cost of maintenance, viz., £250, as compared with the value and importance of the work performed, and with the Annual Parliamentary Vote of £15,000 to the Meteorological Council.

"3. The important geographical position of the Observatory near the entrance of the English Channel, and at the most southerly point of all the stations—being two degrees south of Valencia and seven south of Aberdeen—as affording valuable data for tracing the course of storms (which very frequently approach our shores from a southerly direction), and for investigation of weather changes and other Meteorological phenomena.

"4. The Observatory has the only Bright Sunshine Recorder in the County of Cornwall, and the only Self-recording Rain Gauge in the West of England.

"5. The Observatory furnishes data, with the consent of the Council, for the purpose of scientific inquiry; for the Admiralty Courts, and for Board of Trade inquiries into shipping casualties: also for publication regularly in the Plymouth and local Papers, and in the Polytechnic Society's Reports, in addition to the primary object of sending the most complete returns regularly to the Meteorological Office.

"6. The Observatory has always been selected to supply (by telegraph) weather information from the West whenever telegraphic communications with the reporting station at the Scilly Isles has been interrupted.

"7. It has been the means of stimulating the study and knowledge of the science of Meteorology in the West of England, and its returns are valued exceedingly by the public, and form a standard for private observers throughout the county and beyond its borders, furnishing as it does the most reliable data for determining the climate of the South and West of England."

On the 27th June the Deputation met at the Meteorological Office, at 2 p.m., for a preliminary conference, and at 2.30 p.m. were received by the Meteorological Council, of whom Gen. R. Strachey, C.S.I., F.R.S., Chairman, four other members, and their Secretary, Mr. R. H. Scott, M.A., F.R.S., were present.

The Deputation consisted of the Right Hon. the Earl of Mount Edgcumbe, President, the Right Hon. the Earl of St. Germans, the Right Hon. Lord Robartes, Professor J. Couch Adams, F.R.S., Cambridge, Professor W. Grylls Adams, F.R.S., King's College, London, Professor Warington W. Smyth, F.R.S., Museum of Practical Geology, London, Sir John St. Aubyn, Bart., M.P., Sir Joseph W. Pease, Bart., M.P., Mr. A. Pendarves Vivian, M.P., Mr. C. Dyke Acland, M.P., Mr. D. J. Jenkins, M.P., Mr. Charles C. Ross, M.P., Mr. James Cropper, M.P., Mr. Isaac Wilson, M.P., Col. Tremayne, Mr. T. S. Bolitho, Mr. Howard Fox, Mr. W. Cole Pendarves, Mr. George Hy. Fox, Mr. F. G. Enys, and Mr. E. E. Dymond.

Lord Mount Edgcumbe introduced the Deputation by reading a list of their names, which he handed to the Council. He then read the printed "Memorial of the Royal Cornwall Polytechnic Society to the Meteorological Committee of the Royal Society," and presented it to the Council.

His Lordship next spoke in general terms of the object of the Deputation; and was followed by Mr. D. J. Jenkins, M.P., Sir Joseph W. Pease, Bart., M.P., Mr. A. P. Vivian, M.P., Professor J. Couch Adams, F.R.S., Sir John St. Aubyn, Bart., M.P., Professor Warington W. Smyth, F.R.S., Mr. C. D. Acland, M.P., and Col. Tremayne—all of whom spoke strongly in favour of the retention of Falmouth Observatory, and of the value and utility of the work there carried on. Professor J. C. Adams contended that Falmouth was equally as important a station as Valencia, as it would often record conditions of wind and weather which Valencia would not experience. He considered it to be of the greatest importance that the self-recording instruments at Falmouth Observatory should be maintained in full working order, as the continuance of regular records at the same station become increasingly valuable to science the longer they are carried on.

Gen. Strachey admitted that the Council were making some sacrifice in their proposal to discontinue four primary stations, but stated that the Council felt that the money spent thereon could be employed to a greater advantage to Meteorological science in other directions. He combatted many of the arguments advanced by the various speakers, but added that the Council would carefully reconsider the matter, and asked Professor Adams if he would kindly furnish the Council in writing with the views he had expressed.

On the 5th July Professor Adams sent a statement of his views to the Meteorological Council, which was as follows:—

"TO THE MEMBERS OF THE METEOROLOGICAL COUNCIL.

"In compliance with the wish expressed by some members of the Council at the interview of June 27th, I have great pleasure in explaining my views on the matter then discussed, more fully and clearly than I was able to do *vivâ voce.*

"I.—First, I will say a few words about the relative value, from a scientific point of view, of a continuous record of Meteorological phenomena when compared with occasional observations of the same phenomena.

"In my opinion, the continuous record would be in this case incomparably the more valuable. When we know the laws of variation of an observed quantity, occasional observations at intervals, which may be settled beforehand, are sufficient to determine all the constant quantities which enter into the expression of the law. On the other hand, when the law of variation is in a great measure or altogether unknown, as is the case with most Meteorological phenomena, a continuous record may throw more light on the law or laws of variation than would be afforded by any amount of occasional observations.

"I have no hesitation in expressing my belief that if we ever attain to a knowledge of the principal laws which regulate the weather, it will be as a result from continuous records, and not from occasional observations.

"II.—In the second place, in order to study the laws of variation of any particular phenomena, it is important to have continuous observations at different places, which are not so far distant from each other as to make the circumstances of the phenomena at the different stations differ too widely from one another. In this way only will it be practicable to study and trace the progress of a wave of disturbance of any kind across a given country. From this point of view I do not think that seven stations judiciously distributed over the surface of the British Isles are at all too many. Hence, I should regard the proposed abandonment of four out of these seven stations as a retrograde step, which is greatly to be deprecated

"III.—In the next place, I come to the circumstances which relate to the Falmouth Observatory in particular. The unique situation of Falmouth, nearly at the mouth of the English Channel and considerably to the south-west of any of the other principal Meteorological Stations, will render continuous observations made there peculiarly valuable. Most of our storms and other atmospheric disturbances come from the south-west, and therefore they would first affect and be recorded by the instruments at Falmouth. Valencia is the only other station which can compare with Falmouth in this respect, and I should consider the observations at Falmouth more valuable, as its more southerly situation enables us better to trace the progress of any disturbance across the southern and the central parts of England by comparison with other observations in those parts, while Valencia is too much to the north to answer this purpose.

"IV.—Next I will consider the objection which has been brought against further continuing these observations, viz., that they have already been continued for twelve years, and nothing of importance has been deduced from them. Considering the complicated nature of the phenomena we are concerned with, it is not to be wondered at that little or no progress has been made in twelve years in unravelling their laws. Even in Astronomy, if the fate of the Greenwich Observatory had depended on the results deduced during the first twelve years of its existence from the observations made there, the consequences to the progress of the science might have been disastrous. The fact that we already have twelve years continuous observations at a given place makes any additional observations at the same place much more valuable. Thus twenty-four years' continuous observations at the same place would be much more valuable for any theoretical deductions than twelve years' observations at one place, and other twelve years' observations at a different place.

"V.—There can be no doubt that one of the principal astronomical conditions by which Meteorological phenomena are affected consists in the varying motion of the moon in declination, and this again depends on the position of the moon's node, which takes between 18 and 19 years to perform a complete revolution.

Hence it would be desirable that Meteorological observations should be continued at the same place during one or more revolutions of the moon's node.

This is already well recognised to be necessary in the case of tidal observations. And here I may incidentally remark, though it does not directly affect the Meteorological Council, that Falmouth would be a very important station for making continuous observations of the tides.

"VI.—If the present grant were withdrawn from the Falmouth Observatory, the Cornwall Polytechnic Society have not the means of keeping it up, and the abandonment of the Observatory would be a heavy blow to the cultivation of Meteorological Science in Cornwall and the West of England generally, where there are many local stations which regard Falmouth as their scientific centre.

This is a matter which ought not to be indifferent to the Meteorological Council. No doubt it is no part of the duty of the Council to subsidize local efforts, unless, indeed, by means of such efforts the objects of the Council can be better and more economically carried out than would otherwise be done. I submit that this is the case in the present instance. The difference between the expenditure at Valencia, where the Meteorological Office has to defray the whole cost of the establishment, and the expenditure at Falmouth, affords some indication of the advantages to be derived from local efforts.

"VII.—Lastly, if it is absolutely necessary to reduce the expenditure on some branch of the work undertaken by the Meteorological Office, it may be inferred from what I have already said, that in my opinion the continuous records are almost the last branch in which any reduction should take place.

(Signed) "J. C. ADAMS."

On the 15th July Professor Adams forwarded a copy of his Report to the Committee, who sent it to Mr. A. Pendarves Vivian, M.P., and requested him to take immediate action, pressing for a continuance of the Observatory on the scientific grounds set forth in that Report, and inviting the Council to send down one of their body to inspect the Observatory.

The general question of the discontinuance of the Annual Grants to the Observatories by the Meteorological Council, was also taken up by the British Association for the Advancement of Science at their meeting at Southport, in September, 1883, and fully discussed under Section A. A strong memorial on the subject was drawn up by a committee specially appointed. It was accepted by the Committee of the Section, and ordered to be forwarded to the Council of the British Association, for communication to the Meteorological Council. On the 22nd October letters were addressed to Sir Robert Collier (now Lord Monkswell), Sir Joseph Hooker, F.R.S., Professor Huxley, P.R.S., and Sir Lyon Playfair, M.P., F.R.S., asking them, in case they thought the discontinuance of Falmouth Observatory detrimental to the cause of Meteorological Science, to state their views to the Meteorological Council. Professor Huxley replied on the 23rd October that "The memorial would receive the most careful consideration from the Meteorological Council, and that he was sure that the members of that body would be very glad if, on consideration, they could possibly meet the wishes of the Polytechnic Society."

On the 2nd November the Committee wrote to the Meteorological Council, asking them to favour the Society with their decision as to the retention of the Falmouth Observatory, on the earliest convenient date. Having been informed that the Council in coming to their decision might be affected by the position of the Observatory, the Committee again addressed the Council on the 13th of that month, inviting some member or members of the Council, or an expert on their behalf, to inspect the Observatory, and the position of the instruments, and stating that if the report on such inspection should be unfavourable to the site, the Royal Cornwall Polytechnic Society would enter into negotiations for the erection of a new Observatory, on a site and on terms to be approved by the Meteorological Council. To this the Secretary to the Council replied on the 16th November:—

> "With reference to your letter of the 13th instant, I am directed by the Meteorological Council to state that they are prepared to consider any proposals which the Royal Cornwall Polytechnic Society may wish to make respecting the erection of a New Observatory at Falmouth."

On the 20th November the Secretary of the Council rded copies of an official minute of the Meteorological

Council, 'Explanatory of the reasons for which the Meteorological Council have resolved to close some of their Self-recording Observatories;' and a letter stating that these were for the information of the Society and of those gentlemen who attended as the Society's Deputation.

On the 21st November the following Resolution was unanimously passed by the General Committee, and a copy forwarded to the Meteorological Council, viz:—

"That the Committee of the Royal Cornwall Polytechnic Society invite the Meteorological Council to select a satisfactory site in the neighbourhood of Falmouth, when the Society will immediately take steps for the erection of a New Observatory, the present Observatory to be carried on under the same conditions as at present, until the new one is in working order."

On the 24th November Mr. Scott stated in reply that the letter would be laid before the Council at their next meeting, and that he was instructed by the Chairman to say "That it would materially facilitate business if some gentleman, with authority to speak in the name of the Council of the Royal Cornwall Polytechnic Society, could come to the Meteorological Office to discuss the matter."

On the same date letters were addressed to Lord Kimberley and Mr. G. L. Basset, asking them if they would be willing to grant the necessary land for the erection of an Observatory, should the Council approve of a site on any part of their property. On the 26th November it was resolved "That Mr. Howard Fox proceed to London to confer with the Council, with full power to act at his discretion and as he might find expedient, and that Mr. Robert Fox (who was from home) be requested to join him there if possible."

The Committee were unanimously of opinion:—"(1) That an Observatory should be erected by the Royal Cornwall Polytechnic Society at Falmouth, to meet the approval of the Meteorological

Council, if a convenient site be obtainable. (2) That the new grant should not be less than the maximum old grant of £290 per annum; and (3) that the present Meteorological Council, by a special minute, should recommend that the new grant which may be fixed be carried on by their successors on the Meteorological Council, subject only to the withdrawal of the Parliamentary Vote."

Mr. Howard Fox and Mr. Robert Fox met the Meteorological Council on the 29th November, and did their utmost to induce that body to accede to these terms, which, however, the Council declined to do. The utmost the Messrs. Fox could obtain was conveyed in an official minute of the Meteorological Council of November 29th, forwarded by Mr. Scott to the Secretary on the 6th December, and which was as follows:—

> "The Council are not prepared to increase the grant for an Observatory at Falmouth beyond £250, the sum now allowed, but would continue this grant for the same work that is done at present, but only on the understanding that a New Observatory is built to enable the records to be made under thoroughly satisfactory conditions.
>
> "In addition to this the Council would supply and erect the necessary instruments.
>
> "The constitution of the Meteorological Council prevents their giving any positive pledge as to the continuance of a grant for the maintenance of the Observatory, as this would bind their successors, which they cannot do; but the present Council will, so far as lies in their power, continue the grant for at least five years, on the understanding that on two years' previous notice, the arrangement may be put an end to or modified on the expiration of that term, or at any subsequent date.
>
> "Further, it must be understood that the grant must in all cases be contingent on the requisite funds being voted by Parliament, and subject to the controlling power of the Treasury.

> "If an arrangement on this basis is come to before the end of the year, the Meteorological Council will continue their present grant for the existing Observatory, for such reasonable time as will admit of the erection of the new building."

On the 8th December the Secretary of the Royal Cornwall Polytechnic Society addressed a letter to the Council, stating that the Society would accept these conditions, and inviting Mr. Scott to select the site for the new Observatory. On the 14th December Mr. Scott came down, by appointment, for that purpose, and, in company with Messrs. W. L. Fox and H. Fox, inspected the available sites; and on his return to town, wrote, intimating that the Council would probably adopt his report, which was in favour of the site near Belmont.

On the 21st January, 1884, a letter was addressed to Lord Kimberley, asking for favourable terms for acquiring the necessary land; to which a reply was received on the 4th of February from his lordship's stewards, offering to sell the land at half-price—£400 per acre—but subject to such conditions as to re-entry as could not be accepted. The Committee, considering that they were not justified in taking a site fettered with conditions, addressed a letter to his lordship on the 8th February, accepting his alternative offer of the fee simple of 1 rood 22 perches of land, fixed upon as the site, for £310, being at the rate of £800 per acre, and asked that the purchase-money might be paid in three equal annual instalments. On February 13th Lord Kimberley's stewards wrote, stating that if the purchase of the land were completed by Midsummer, 1884, his lordship would give a donation of £30.

At the Annual General Meeting of the Polytechnic Society, held on 14th February, it was resolved as follows:—"That Earl Kimberley's offer be accepted, and that the whole matter be left with the Observatory Committee for settlement, who are requested by this Meeting—in addition to taking such other measures for the purpose as they may deem desirable—to forward a circular to all friends of the Society, for the purpose of soliciting their help towards raising the purchase-money of the site selected, and the cost of erecting a new Observatory."

In accordance with this resolution a circular was drawn up, setting forth the conditions on which the Meteorological Office would continue the Observatory at Falmouth; an offer of the Royal Society with regard to the establishment of regular magnetic observations; and the financial requirements for the purchase of land and the erection of the Observatory buildings.

Mr. Scott having in the meantime been furnished with Ordnance Maps of the neighbourhood and a tracing of the site to be granted by Lord Kimberley, replied to Mr. W. L. Fox on the 20th February as follows:—"With reference to your letter of the 16th instant, I am directed by the Meteorological Council to inform you that the site for the new Falmouth Observatory proposed in your letter above referred to was approved by them. I enclose a copy of my report, which has also been approved."

Mr. Scott's report was as follows, viz.—

"Gentlemen,

"I have the honour to report, that in accordance with your instructions, I visited Falmouth on the 14th ultimo, and inspected, in company with Messrs. Howard Fox and W. L. Fox, the new sites proposed for the Observatory to be erected at Falmouth. They are all situated on land now vacant, but to be shortly covered with buildings.

"The present Observatory is seated on the brow of a steep hill over the harbour, at the height of 173·5 feet, being a slope of 1 foot in 4·6.

"Site A lies nearly 400 yards west of the Observatory, and at an elevation 20 feet higher.

"Site B is close to site A, and at the same level.

"Site C is distant 200 yards further than A, and in the same direction. Its elevation is 163 feet, and the ground falls away from it at a slope of 1 foot in 14·6 to a water-course, level 40·4 feet, leading to a pond called Swanpool, "Of these sites the last named appears to me to be the best, for although the two former are situated on the rounded top of the hill, while C is on the western slope, the ground about C is to be covered with detached villas, while that adjacent to the other sites will be given up to streets and terraces, and although some of the roads are to be 50 feet wide, I consider that much more open space will be available at C, which lies at a cross road, than at either of the others.

"The actual site obtainable at C will probably be sufficiently spacious.

"For these reasons I beg to report that C is the most eligible site for an Observatory that has been shown me at Falmouth.

(Signed), "ROBERT H. SCOTT."

On 26th February Messrs. Tilly and Fox were instructed to carry out the purchase of the site on behalf of the Society; the land to be vested in the present trustees of the Polytechnic Society; and Messrs. H. Tilly, W. L. Fox, and E. Kitto were appointed a Building Committee, with power to obtain plans and to carry out the work.

A careful calculation was then made of the accommodation necessary, both for Observatory purposes and for a dwelling for the Observer, and rough plans of ground and first floor and possible position of Magnetograph chamber were prepared. These were first sent to Mr. G. M. Whipple, the Superintendent at Kew, who made several valuable suggestions thereon, and then to Mr. J. A. Tregelles, architect, of 46, New Broad Street, London, requesting him to prepare plans for a good substantial building. On the 6th May Mr. Tregelles met the Committee by appointment, and submitted rough plans for the buildings, which were carefully and fully discussed, and Mr. Tregelles authorised to prepare complete plans, specification, and contract.

On 7th June Mr. Tregelles' plans were accepted by the

Committee. Tracings were subsequently submitted to the Meteorological Council, and approved by them by letter from Mr. Scott, dated 9th July (No. 1,465), stating that "the architect had submitted the plans of the new Observatory to him on the 2nd instant, which are satisfactory." Tenders for the erection of the building were invited by public advertisement, in response to which six were received.

The Building Committee procured the services of Mr. W. May, of Pool, to advise them on the specification. This resulted in several important alterations and additions, decided upon after consultation with the architect, and which, while making the building more commodious and complete, slightly reduced the total cost. Messrs. Olver and Sons (whose original tender was the lowest) having agreed with the architect and Committee as to the price of the alterations, their amended tender was accepted, and the plans, specification, and contract were signed by them on the 29th July, 1884, they undertaking to carry out the work for the sum of £826, within nine months. Arrangements were made with Mr. May to act as clerk of the works.

On the 26th June the Committee wrote to the President, the Right Hon. the Earl of Mount Edgcumbe, asking if he would consent to lay the Foundation Stone of the New Observatory, if the Committee arranged that the ceremony should take place on the opening day of the Exhibition, August 12th, which his Lordship gladly consented to do.

The Committee then passed the following resolution:—
"That it having been ascertained that Lord Mount Edgcumbe will be present at the opening of the Polytechnic Exhibition, and it being most important that the Foundation Stone of the new Observatory should be laid by his lordship on that day, Mr. Robert Fox be requested to kindly undertake, with the aid of such gentlemen as he may select, the arrangements that may be necessary to carry out the ceremony in a suitable manner, and be authorised to incur such expenses as he may deem necessary."

On the 2nd August Mr. G. M. Whipple, B.Sc., Superintendent of Kew Observatory and official Inspector for the Meteorological Council, being at Falmouth on his annual inspection of the Observatory, laid down the lines of the new building, so that the walls should run true north and south; after which Messrs. Olver and Sons vigorously began the preparation of the foundations.

The purchase-money and costs of the site were paid on the 7th August, the conveyance executed by Earl Kimberley having previously been handed over to this Society's legal advisers.

On the passing of the before-mentioned minute Mr. Robert Fox at once commenced preparations for the event, sending out invitation cards to over 400 members and friends of the Society. Replies were received from about 250, of whom half accepted, asking that 350 places might be reserved for themselves and party.

A covered dais was erected inside the foundations of the building for the President and some of the principal supporters, and a large platform was laid down in front, on which about 350 seats were provided.

Messrs. John Freeman and Sons most generously gave a handsome granite foundation stone, on which they inscribed—

THE
EARL OF MOUNT EDGCUMBE,
President of the
R. C. Polytechnic Society,
LAID THIS STONE,
Aug. 12, 1884.

J. A. Tregelles,
Architect.

Olver and Sons,
Builders.

Mr. Howell and his Coastguardsmen decorated the place with flags, and during the ceremony the band of H.M.S. "Ganges," conducted by Mr. Bishop, played at intervals.

At 4 p.m. of the 1st August, 1884, the President and a large and distinguished company assembled on the site, the weather at that time being fine.

The Venerable the Archdeacon of Cornwall offered prayer. Sir John St. Aubyn, Bart., M.P., presented the trowel to the President on behalf of the Society, and requested him to lay the foundation stone.

The President, the Rt. Hon. the Earl of Mount Edgcumbe, Lord Lieutenant of the County, after placing in a cavity beneath the stone a bottle containing a copy of the two Plymouth papers of that date, and a first class Bronze Medal of the Royal Cornwall Polytechnic Society, duly fixed the stone in its proper place, and declared it well and truly laid and level.

Mr. Robert Fox next presented to his Lordship, on behalf of the Society, some of those who had been active in the work, viz.: -

Harry Tilly, Chairman of the Observatory Committee, Vice-President of the Royal Cornwall Polytechnic Society.

Wilson Lloyd Fox, F.R.Met.Soc., Hon. Sec. of the Meteorological Department of the Polytechnic Society.

Edward Kitto, F.R.Met.Soc., Secretary of the Observatory Committee, Secretary of the Polytechnic, and Superintendent of the Observatory.

J. Allen Tregelles, Architect of the Observatory.

Thomas R. Olver, Builder of the Observatory.

The President then delivered an excellent address, speaking of some of the difficulties the Society had encountered, and the special efforts it had made in endeavouring to retain a first-class Meteorological Observatory at Falmouth; naming some of the scientific gentlemen who had materially aided the object in view; explaining the various instruments in the Observatory and their uses; referring to the set of magnetographs for recording the declination of the needle and the force of magnetic currents, which were to form a new and special feature of the Observatory to be erected; and finally appealing to those outside the County as well as those within it, and to scientific bodies especially, for support towards the £1,300 required to pay for the land, building, and expenses connected therewith, of which £450 had been so far promised. A collection was then made, headed by £20 from the noble President, which resulted in the addition of £75 to the funds in money and promises.

The High Sheriff of Cornwall, Mr. T. Bedford Bolitho, proposed a vote of thanks to the President. He thought Falmouth was pre-eminently fitted for an Observatory of that kind, both on account of its geographical situation, and of the scientific people connected with it. He concluded with a happy reference to Miss Fox, who was present, and her approaching visit to Canada to attend the meeting of the British Association.

Mr. W. Pengelly, F.R.S., of Torquay, seconded the vote of thanks in a facetious speech, and it was carried with cheering.

The proceedings, which were highly successful throughout, then terminated.

In addition to those already named, who took part in the ceremony, there were present amongst others :—Lord Raynham, Mr. T. S. Bolitho, Mr. M. H. Williams, Canon Phillpotts, Rev. W. Rogers, Rev. B. Christopherson, Rector of Falmouth, Capt. Brydges (H.M.S. Ganges), Mr. Edmund Backhouse, Mr. Piers St. Aubyn, Mr. Howard Fox, Vice-President, Mr. J. C. Kennerley, Vice-President, Mr. W. M. Grylls, Mr. R. H. Alexander, Mr. W Marriott, Assist.-Sec. of Royal Meteorological Society, Major Gen. Aylmer, Major Gen. Pearse, Lieut.-Col. Carlyon, Commander Liddell, R.N., Lieut. Reed, R.N., Revs. S. Phillpotts, C. W. Carlyon, G. T. Bull, W. Jago, and F. R Hole, Drs Barham, Ross, Sturges, and Harris, Messrs. A. Lloyd Fox, F. E. Fox, G. H. Fox, G. Croker Fox, G. Hart Taylor, J. K. Kinsman, R. R. Broad, H.

C. Broad, W. J. Genn, S. Bennetts, H. Young-Jamieson, Bernard Freeman, H. S. Mackenzie, H. M. Jeffery, F.R.S., Henry Pollard, J. H. Collins, F.G.S., W. Naylor Carne, W. Brooks, John Jose, J. S. Perry, W. Simon; also the Mayor and Corporation of Falmouth, Chairman and Members of the Parish Local Board, Falmouth Harbour Board, Falmouth School Board, Falmouth Docks Board, and Chamber of Commerce; and a large number of ladies.

A full and accurate summary of the proceedings appeared in the *Falmouth Packet* of the 16th August, prepared by Mr. Robert Fox from the accounts which had appeared in the *Western Morning News* and *Western Daily Mercury* on the 13th August, and from other sources. Reprints of this account, together with a complete list of donations, were sent by him to about 450 addresses, and a stamped envelope, with a form of promise to give, was also enclosed to those who had not already contributed.

To the following, who assisted gratuitously, letters of thanks were sent:—

Capt. Brydges, R.N., for the Band of H.M.S. "Ganges."
Mr. Howell and the coastguardsmen, for flag decorations.
Trustees of Congregational School, for loan of chairs.
Inspector Pappin and the County Police, for services at the ceremony and guarding the site for two nights.
Messrs. Lake and Co., for printing full list of donations in the *Falmouth Packet* of August 23rd.
To Messrs. John Freeman and Sons, the special thanks of the Society for the present of the much admired Foundation Stone, were tendered by the Committee.

The expenses for platforms, trowel, stationery, printing, postages, &c., amounted to £26 18s. 0d.

Up to the date of the foundation stone laying the amount promised and given was a little under £450; by the end of August it had risen to £600.

The Committee recorded its sense of the deep obligation the Society is under to Mr. Robert Fox—for his readiness in undertaking the onerous duties imposed upon him; for the energy with which he made all the arrangements, at a very short notice, for laying the Foundation Stone; and for the great ability with which he managed the proceedings and brought them to a happy and successful termination.

From the time of the public ceremony of laying the foundation stone on the 12th August, 1884, the new Observatory buildings progressed steadily and satisfactorily. On the 1st November the walls were raised to the level of the roof, and the building was covered in before the end of the year. The plastering, both inside and outside, was commenced early in January, 1885, and the iron column for the Anemometer, supplied by the Meteorological Office, was received and fixed in position by the end of that month. During February, March, and April the internal work of the building was carried on without interruption, and everything got ready to receive the various instruments. On the 28th April Mr. G. M. Whipple, Superintendent of Kew Observatory, arrived at the Observatory, and on the following day commenced to fix the Anemometer, which had previously undergone repairs by Mr. R. W. Munro, of London, by the authority and at the expense of the Meteorological Office. The fixing was completed and the instrument started at work on the 1st May, and by the 6th May satisfactory records were obtained. On May 1st the Barograph and Thermograph instruments were stopped at the old Observatory, taken down, removed, and refixed in the new building, and after some preliminary experimental work, were started for regular photographic records on the morning of May 9th.

From this date a new system of photography was introduced, the waxed paper being substituted by Morgan and Kidd's argentic gelatino-bromide paper, which is much more sensitive, more quickly manipulated, and gives more satisfactory results than the paper formerly used. On the recommendation of Mr. G. M. Whipple, and with the approval of the Meteorological Council, duplicate photographic curves of pressure and temperature have been discontinued.

The self-recording Beckley Rain Gauge was removed from Mrs. Philp's garden on Woodlane, and fixed in the Observatory garden, at a height of 168 feet above mean sea level, the copper gauge being left on Woodlane until the 31st December, for comparison of the rainfall at the two places.

The Sunshine Recorder was also removed from the old tower, and fixed on the stair-head of the new Observatory, and subsequently the standard Barometer was removed and fixed in the room above the office. The height of its cistern was determined at 183 feet above mean sea level.

On May 9th, the building was formally handed over by Messrs. Olver and Sons, the contractors, the whole of the work being finished and the instruments all fixed in working order, within about a week of the date stipulated for completion of the buildings. On the 14th May Mr. Kitto took up his residence at the Observatory, and during the month of June the Observatory grounds were thoroughly cleaned, levelled, and laid out with well-made gravelled walks, and turf edging to slopes, beds, etc.

On 4th July a lightning tape was fixed at the building, in accordance with instructions from Gray and Sons, of London, the makers, who sent in the lowest tender; the cost of which was defrayed by the Meteorological Council. The upper part was secured to the base of the Anemometer column; the tape runs over the leading and roof-slates, is continued down the east wall, and carried underneath the ground to a considerable distance from the building.

On 23rd June the Anemograph, which had not been working satisfactorily, was taken down, and sent to Mr. Munro for re-adjustment of the pencils, by order of Mr. R. H. Scott, and was returned to the Observatory, fixed and re-started by Mr. Kitto on the 16th July.

On the 25th July the Sunshine Recorder was removed from the top of the stair-head on roof, and fixed above the hand-rail, about 8 feet south of that position, the change being necessitated on account of the ladder of the Anemometer casting its shadow on the instrument for a short time during the early morning. It has now an uninterrupted exposure.

On the 30th June the following interesting account of the new Observatory appeared in the *Western Morning News*:—

"Situated at the junction of the top of Killigrew-street with Western-terrace, almost directly opposite Belmont, Falmouth new Observatory stands upon a site in every way suited to the requirements of the institution. The grounds are about one-third of an acre in extent, so that the various instruments will have an uninterrupted exposure—more especially necessary in the case of rain guages—and the grounds will also allow for the subsequent erection of a small house, intended to contain appliances for taking absolute magnetic observations, and for any other instruments which may hereafter be added to the institution. The Observatory has been built in the form of a modern detached villa, the superintendent's dwelling-house and the Observatory proper being in one structure. The edifice—the lines of which are laid due north and south—presents a very neat and attractive appearance, and is in the Queen Anne style. The architect, Mr. J. A. Tregelles, of London, has shown much ingenuity in the general design, and he has likewise paid careful attention to all the external and internal details, so as to make the building as finished, compact, and handsome as possible. There are seven rooms in the private part (occupied by Mr. E. Kitto, F.M.S., the superintendent), and the same number in the portion devoted to the carrying on of the observations, the two divisions being approached by separate entrances. The building is practically of two storeys, yet below the ground-line is a large and commodious subterranean chamber, which has been especially constructed for the reception of Magnetographs—an entirely new department of the work of the Observatory, and quite apart from the observations carried on by the Meteorological Office, the funds for the purchase of these magnetic instruments having been provided by the Royal Society.

"Entering the building by the Observatory gate, the office is first reached. It is carefully lighted for the convenience of tabulating the records of the various instruments. Adjoining the office, on the same floor, is the photographic (or "dark") room, fitted with every convenience for the manipulation of the photographic records. As indicating that every improvement has been taken advantage of, not only in regard to the building itself but also to the actual work of observations, it may be here mentioned that the barographic and thermographic records are now made by a new and much improved method of photography to that adopted at the old Observatory, the "results" being obtained with much greater rapidity, brilliancy, and sharpness of definition than has hitherto been the case. The magnetic records will also be taken by the same system of photography. A short passage leads to the instrument-room, where the barograph and thermograph are situated, and rendered dimly visible by the lurid light admitted through the deep ruby glass with which the window of the room is glazed. The self-recording and other thermometers are fixed on the north side of the house, enclosed in a louvred-screen, having a perfect exposure. In the old Observatory the instruments, the photographic room, and office were all on separate floors; now they stand on the same floor, and thus a very material improvement has been effected. In the room above is situated the anemograph—or wind-recording instrument—by which a continuous record of the velocity and direction of the wind is made. The anemometer, with its revolving cups, is fixed on the roof of the house, which has been specially constructed for the firm support of this instrument. The upper part of the roof is flat, covered with lead, and surrounded by an ornamental railing. An iron column rises to a considerable height from the flat roof, and on it the anemometer is fixed. This shaft is a very great improvement in appearance to the heavy wooden staging which supported the instrument on the recently vacated tower, and gives—together with the revolving cups—an effective and characteristic aspect to the Observatory. At the head of the stairway leading out on the roof is placed a perpetually-registering bright sunshine recorder. It is an interesting fact—and one which in itself shows the value and importance of the Falmouth Observatory—that the amount of bright sunshine recorded on the south-west coast of England exceeds the quantity registered in most other parts of the kingdom. All the registering instruments at the Observatory are self-recording, but the data thus obtained are carefully supplemented and checked by eye-observations, taken every two hours during the day.

"On the grounds of the Observatory are placed two rain gauges. One is an ordinary 8-inch copper guage, by Casella, and the other is a self-recording Beckley-gauge, which is a most ingenious piece of mechanism, showing clearly not only the amount of rain-fall—however slight—but the hour at which it occurs. These gauges have a perfect exposure, the level and tastefully laid out grounds being bounded by a low, granite-faced hedge, which, within the enclosure, supports a gently-sloping bank.

"The Observatory has just been completed by the contractors, Messrs. Olver and Sons, Green Bank, Falmouth, the amount of whose tender was £826. They have executed their agreement in a highly creditable manner, and have given complete satisfaction by their work. The magnetographs have not yet arrived, so that the new Observatory cannot be described as in full working order. These instruments are being specially made for the Falmouth Observatory, and will not be completed for some months. When, however, they have arrived, the Falmouth meteorological station will be one of the most complete in the United Kingdom. The records made, after careful tabulation, are regularly forwarded once a week to the Meteorological Office, London, and yearly weather tables are published in the reports of the Royal Cornwall Polytechnic Society. It will thus be seen that that Society was fully justified in putting forth strenuous efforts to retain for Falmouth such an important institution as its Observatory. Mr. Wilson Lloyd Fox, the Honorary Secretary of the Meteorological Committee, has shown a close and unflagging interest in the work, and to him must be given the largest share of the credit for having brought so difficult a task to such a happy consummation. He has been most zealously supported in fighting against what at one time appeared a forlorn hope by Mr. Harry Tilly, the Chairman of the Observatory Committee; and upon Mr. Kitto, the esteemed Superintendent, a heavy amount of arduous work has fallen, which he has carried out with much zeal and attention."

Messrs. Olver and Sons' detailed account for the whole of the work executed by them was submitted to the Committee, who made a thorough examination of the various items and charges therein enumerated, and after conferring with the contractors on some points of difference, were able to settle everything amicably, and to the entire satisfaction of both parties.

The extras included the finishing of the N.E. and S.E. upper rooms, the pointing of the N. and E. fronts of the building, an extension of the sanitary arrangements, and other items which were not anticipated when the original specification was drawn, [illegible] The whole was [illegible]

[illegible] Committee on the [illegible] to Messrs. Olver and [illegible] had carried out their [illegible] Buildings, and the [illegible] the courteous way in [illegible] and by Mr. Williams, [illegible] that the balance of [illegible] March next, be immediately [illegible]

[illegible] removing and refixing the [illegible] £43 6s. 3d., was sent to [illegible] December, and was promptly [illegible]

[illegible] buildings and premises, [illegible] paid in accordance with [illegible]

[illegible] September, 1885, the President, [illegible] Edgcumbe, announced that [illegible] second donation) to [illegible] should be raised [illegible] Fox's offer had been hand[illegible] Penjerrick. His Lordship, [illegible] further contributions, and the [illegible] 1884 was brought up to [illegible] A list of donations promised [illegible] of the Observatory Com[illegible] 1885, are appended.

[illegible] a photograph of the Observatory, taken by Mr. W. M. Harrison, of Falmouth, and presented by him to the Society, forms a frontispiece to the Annual Report.

On behalf of the Observatory Committee,

(Signed),

HARRY TILLY, Chairman.

Dated Polytechnic Hall, Falmouth,
1st February, 1886.

The Observatory Committee in account with the Royal Cornwall Polytechnic Society,

Dr. **1885.** Cr.

Dr.				£	s.	d.
To Donations to 31st December, 1884				668	2	6
Ditto during the year 1885	£117	17	0			
Less amount not yet received	17	10	0			
				100	7	0
Proceeds of Lecture by Mr. O. Walford				2	11	0
Fixtures				12	0	0
Meteorological Council for removing and re-fixing Instruments				43	6	3
				£826	6	9
Cornish Bank, Limited—Amount due to them on December 31st, 1885				498	18	0
				£1,325	4	9

Cr.				£	s.	d.
By Lord Kimberley for freehold site				310	0	0
Smith and Paul, conveyance				14	8	6
Tilly and Co., conveyance, contracts, &c.				10	10	0
Laying Foundation Stone				26	18	0
Olver and Sons per contracts	£873	17	9			
Amount still due to them	50	15	0			
				823	2	9
J. A. Tregelles, architect's fees				32	5	3
W. May, clerk of works, fees				6	6	0
R. Vivian, boundary hedge				52	5	0
A. Davey, cleaning and laying out grounds				10	0	0
Per Polytechnic Society :—						
Advertising, postages, stationery	£11	2	0			
Carriage of Instruments, Packing cases, &c.	3	11	8			
Lightning tape	4	15	0			
Re-fixing Instruments and extra items in Photo. room	1	1	4			
Clearing grounds, shrubs, planting, &c.	1	17	6			
Redemption of Land Tax	0	7	6			
				22	15	0
Cheque Book				0	2	0
Interest—						
To December, 1884, Cornish Bank	0	13	3			
To Midsummer, 1885, "	6	10	0			
To December 31st, 1885, "	9	9	0			
				16	12	3
				£1,325	4	9

Signed,

HARRY TILLY,
WILSON L. FOX,
EDWARD KITTO, } *Building Committee.*

The New Observatory.

	£	s.	d.
Donations to 31st December, 1884, as published in the Annual Report for 1884	668	2	6

DONATIONS FOR 1885.

Miss Fox, *Penjerrick* (2nd donation)	25	0	0
Mr. Robert Bayly	20	0	0
Mr. J. Bayly	10	0	0
Mr. Reginald B. Brett	10	0	0
Mr. George H. Fox (2nd donation)	10	0	0
Mr. Robert Fox (ditto)	10	0	0
Mr. F. W. Bond	5	5	0
Mr. Francis Bassett (2nd donation)	5	0	0
Mrs. A. Lloyd Fox, *Penmere*	5	0	0
Right Hon. Earl of Kimberley, K.G. (2nd donation)	5	0	0
Mrs. R. F. Sturge, *Clifton*	5	0	0
Mr. Henry M. Jeffery, F.R.S. (2nd donation)	2	10	0
Rev. Sir Vyell Vyvyan, Bart. (ditto)	2	0	0
Mr. R. Mason Pooley, M.D.	1	1	0
Mr. P. D. Tuckett	1	1	0
Mr. D. T. Savary	1	0	0
Total	£785	19	6

Committee in account with the Royal Cornwall Polytechnic Society,

1885.

Cr.

		£ s. d.
To [illegible] December, 1884		666 2 6
[illegible] the year 1885	£117 17 0	
Less amount not yet received	17 10 0	
		100 7 0
Proceeds of Lectures by Mr. C. Walford		2 11 0
[illegible]		12 0 0
Meteorological Council for removing and re-fixing Instruments		45 6 3
		£826 6 9
Cornish Bank, Limited—Amount due to them on December 31st, 1885		498 18 0
		£1,325 4 9

			£ s. d.
By Lord Kimberley for freehold site			310 0 0
Smith and Paul, conveyance			14 8 6
Tilly and Co., conveyance, contracts, &c.			10 10 0
Laying Foundation Stone			26 18 0
Olver and Sons per contracts	£873 17 9		
Amount still due to them	50 15 0		
			823 2 9
J. A. Tregellas, architect's fees			32 5 3
W. May, clerk of works, fees			6 6 0
R. Vivian, boundary hedge			52 5 0
A. Davey, cleaning and laying out grounds			10 0 0
Per Polytechnic Society:—			
Advertising, postages, stationery		£11 2 0	
Carriage of Instruments, Packing cases, &c.		3 11 8	
Lightning tape		4 15 0	
Re-fixing Instruments and extra items in Photo. room		1 1 4	
Clearing grounds, shrubs, planting, &c.		1 17 6	
Redemption of Land Tax		0 7 6	
			22 15 0
Cheque Book			0 2 0
Interest—			
To December, 1884, Cornish Bank		0 13 3	
To Midsummer, 1885, ,,		6 10 0	
To December 31st, 1885, ,,		9 9 0	
			16 12 3
			£1,325 4 9

Signed,

HARRY TILLY,
WILSON L. FOX,
EDWARD KITTO,
} *Building Committee.*

The New Observatory.

	£	s.	d.
Donations to 31st December, 1884, as published in the Annual Report for 1884	668	2	6

DONATIONS FOR 1885.

Miss Fox, *Penjerrick* (2nd donation)	25	0	0
Mr. Robert Bayly	20	0	0
Mr. J. Bayly...	10	0	0
Mr. Reginald B. Brett	10	0	0
Mr. George H. Fox (2nd donation)	10	0	0
Mr. Robert Fox (ditto)	10	0	0
Mr. F. W. Bond	5	5	0
Mr. Francis Bassett (2nd donation)	5	0	0
Mrs. A. Lloyd Fox, *Penmere*	5	0	0
Right Hon. Earl of Kimberley, K.G. (2nd donation)	5	0	0
Mrs. R. F. Sturge, *Clifton*	5	0	0
Mr. Henry M. Jeffery, F.R.S. (2nd donation) ...	2	10	0
Rev. Sir Vyell Vyvyan, Bart. (ditto)	2	0	0
Mr. R. Mason Pooley, M.D.	1	1	0
Mr. P. D. Tuckett	1	1	0
Mr. D. T. Savary	1	0	0
Total	£785	19	6

Treasurer in Account with the Art Union of Cornwall,

1885.

Dr.	£	s.	d.	Cr.	£	s.	d.
To Balance from 1884	3	4	6	By paid printing Tickets and Advertising	1	12	6
„ 1,078 Tickets	53	18	0	„ Stationery, Postages, &c.	1	1	0
„ Commission from Artists	3	2	4	„ Commission to Agents	3	1	6
„ „ „ Prize Holders ...	1	7	0	„ Prizes	52	0	0
				„ Balance	3	16	10
	£61	11	10		£61	11	10
To Balance to 1886	3	16	10				

W. W. J. SHARPE, *Hon. Secretary.*

E. KITTO, *Manager.*

Report of the Art Union of Cornwall, 1885.

The Committee have to report that the Annual Drawing took place on the 25th September, at 9 p.m., in the Polytechnic Hall, Falmouth, Mr. E. D. Anderton in the chair.

The ticket books were checked by G. Lanyon and R. Fox, and the tickets by E. D. Anderton, M. R. Tweedy, and E. Kitto, and again by the whole of the Committee.

The value of the tickets sold amounted to £53 18s., which, with the balance of £3 4s. 6d. from 1884, amounted to £57 2s. 6d., of which it was resolved to give £52 in prizes.

The value of the works of art chosen as prizes amounted to £62 14s. 0d.

The tickets were drawn from the wheels by Miss Lelean and Master Walton.

The prize winners are as follows :—

Nos.		£	s.	d.
813	Mrs. S. Tresidder, jun., Falmouth	3	0	0
1908	E. O. Reece, Birmingham	3	0	0
1292	Col. Tremayne, Carclew	1	0	0
641	F. M. Harris, Falmouth	1	0	0
611	W. Gooding, Falmouth	2	0	0
1409	R. B. Brett, M.P., London	1	0	0
1479	Thomas Grenfell, jun., Calstock	3	0	0
917	Miss K. Mackenzie, Green Bank Hotel, Falmouth	10	0	0
649	J. P. Dunstan, St. Columb	1	0	0
420	Miss Mann, care Canon Rogers, Gwennap	2	0	0
307	Mrs. Shuter, Reigate	2	0	0
1477	Mrs. Kitto, Falmouth Observatory	5	0	0
628	Mrs. Sharwood, London	1	0	0
893	W. W. Winter, Derby	3	0	0
1291	Colonel Tremayne, Carclew	2	0	0
716	W. E. Downing, Falmouth	7	0	0
469	D. T. Savary, Falmouth	5	0	0

Treasurer in Account with the Royal Cornwall Polytechnic Society

Dr. 1885. **Cr.**

Dr.	£ s. d.	£ s. d.
To Balance from 1884 in Cornish Bank, Limited ...	[illegible] 11 7	
Ditto due from Observatory Committee	[illegible]	
Ditto in Secretary's hands	[illegible] 7	
		[illegible]
Royal Donations		[illegible]
Members' Subscriptions ...	[illegible]	
Arrears received	[illegible]	
Subscriptions from Mines	[illegible]	
		[illegible]
Competition Money		[illegible] 0
Admission at Exhibition and sale of Catalogues:—		
First day	[illegible]	
Second day	[illegible]	
Third day	[illegible]	
Fourth day	[illegible]	
Fifth day	[illegible] 0	
Season Tickets	[illegible] 0 0	
		[illegible] 7 [illegible]
Commission on Sale of Pictures, &c.		[illegible]
Advertisements in Exhibition Catalogue		[illegible] 0
Rent of Hall and Gas		[illegible] 11 0
Sale of Reports		[illegible] 0
"Lander" Prizes—J. C. Kennerley, Esq.		1 0 0
Interest on Deposit		[illegible] 0 0
		£2570 0 1

Cr.	£ s. d.	£ s. d.
By Salary and Travelling Expenses of Secretary		[illegible]
Salary of Curator		[illegible]
L. C. Wyon for Medals		[illegible]
Annual Report		[illegible]
Carriage of Goods at Exhibition		[illegible]
Labour and attendance at Exhibition, erecting Stalls, &c. Arrears 1884 Drill Hall		
1885, Polytechnic Hall	[illegible]	
Agents Packing Pictures, &c. ...		[illegible]
Exhibition Catalogues ...		[illegible]
Lectures, Concerts, &c. ...		[illegible]
Prizes paid in Cash		[illegible]
Judges' Luncheon, on account		[illegible]
Advertisements, arrears 1884	[illegible]	
" 1885	[illegible]	
		[illegible]
Stationery, Printing, Postage, &c.		[illegible]
Repairs, Rates, Taxes, and Insurance		[illegible]
Gas		[illegible]
Attendance and Cleaning Hall		[illegible] 10 0
Balance in Cornish Bank, Limited:—		
Deposit Account £100 0 0		
Current Account 79 13 7		
	179 13 7	
Balance in Secretary's hands	1 15 5	
		181 9 0
		£2570 0 1

	£ s. d.	£ s. d.
ASSETS:		
Balance in Cornish Bank, Limited	179 13 7	
Ditto in Secretary's hands	1 15 5	
Subscriptions unpaid	5 0 0	
		186 9 0
LIABILITIES:		
Bills due (estimated)		10 0 0
Balance in favour of the Society		£176 9 0

Examined with the Vouchers and found correct, 21st of January, 1886.

W. SLADE OLVER, } *Finance*
HOWARD FOX,

List of Donors and Subscribers,

1885.

Donors.

Her Most Gracious Majesty the QUEEN, Five Pounds.
His Royal Highness the PRINCE of WALES, Five Pounds.

Subscriptions from Mines.

	£	s.	d.
East Pool Mine	3	3	0
The Mellanear Copper Mine Company	2	2	0
Pontgibaud Mining and Smelting Company	2	0	0
The Linares Lead Mining Company	1	1	0
The Alamillos Company	1	1	0
The Fortuna Company	1	1	0

Subscribers in the County of Cornwall.

Those marked with an asterisk are Members of the Committee.

	£	s.	d.
*Anderton, E. D., *Falmouth*	0	10	0
Anderton, Mrs., *do.*	0	5	0
Anderton, Miss, *do.*	0	5	0
Aylmer, Major-General, *do.*	1	0	0
Banks, E., *do.*	0	5	0
Banks, Mrs., *do.*	0	5	0
Banks, Miss, *do.*	0	5	0
Banks, J. R., *Penryn*	0	10	0

	£	s.	d.
Barclay, J., *Falmouth*	0	10	0
Barclay, Miss, *Meudon*	1	1	0
*Basset, G. L., *Tehidy*	1	1	0
Batting, Mrs. Norman, *Falmouth*	0	5	0
*Beauchamp, E. B., *Trevince*	0	10	0
Bennett, Rev. J. H. P., M.A., *Falmouth*	0	5	0
Bennett, Mrs., *do.*	0	5	0

	£	s.	d.
Bennett, Miss, *Falmouth*	0	5	0
Bennetts, J. P., *do.*...	0	10	0
*Bennetts, S., *do.* ...	0	10	0
Beringer, John J., F.C.S., *Camborne*...	0	10	6
*Bolitho, T. S., *Penzance*.................	1	1	0
Bolitho, W., jun., *do.*	0	10	0
Bolitho, T. Bedford, *do.*	1	0	0
Bolitho, T. R., *do.* ...	1	0	0
Borlase, Mrs., *do.* ...	0	5	0
*Borlase, W. Copeland, M.A., M.P., *do.*	0	10	0
Boulderson, Miss, *Falmouth*	0	5	0
*Bowles, F. J., *do.* ...	0	10	0
Bowles, Mrs., *do.*......	0	5	0
Broad, R. R., *do.*......	0	10	0
Broad, Sydney, *do.*...	0	5	0
Broad, Mrs. S., *do.*...	0	5	0
Broad, Miss, *do.*......	0	5	0
Broad, Miss G., *do.*	0	5	0
Broad, William, *do.*	0	10	0
Broad, Mrs. Wm., *do.*	0	10	0
Broad, Herman U., *do.*	0	10	0
Broad, Mrs. H. U., *do.*	0	5	0
Brown, Miss Ellen, *do.*	0	5	0
Brown, Miss Sarah R., *do.*	0	5	0

	£	s.	d.
*Bull, Rev. G. T., M.A., *Camborne*...	0	10	0
Bull, M. V., *Roscarrack, Falmouth*... ..	0	10	0
Bull, Mrs., *do.*.........	0	5	0
Buller, J. F., *Morval, Liskeard,*	2	2	0
Bullmore, W. K., M.D., *Falmouth* ...	0	10	0
Bullmore, Ernest, *do.*	0	10	0
Cardew, Mrs., *do.* ...	0	5	0
*Carew, W. H. P., *Antony, Devonport*	1	0	0
*Carlyon, Rev. C. W., *St. Just*..............	0	10	0
Carne, E. C., *Falmouth*	0	10	0
Carne, Miss, *do.*	0	5	0
*Carne, W. Naylor, *St. Agnes, Scorrier*	0	10	0
Carne, Mrs. W. N., *do.*	0	5	0
Carne, Miss, *Penzance*	1	0	0
Carne, Mrs. Fred., *Falmouth*	0	5	0
*Carter, R. H., *do.*...	1	1	0
*Carter, R., *do.*	0	5	0
Carter, Miss, *do.*	0	5	0
Carter, Ben., *do.*	0	5	0
*Clift, Mrs., *do.*	0	5	0
Cox, Henry, *do.*	0	10	0
Cregoe, J. P., *do.*......	0	5	0
Cregoe, Mrs., *do.*......	0	5	0
Cregoe, Archie, *do.*...	0	5	0

	£	s.	d.
Christoe, W. H., *Falmouth*	1	0	0
Cuttance, E., *do.*	0	10	0
Dash, Miss, *do.*	0	5	0
Daubuz, J. C., *Carvedras, Truro*	1	0	0
Diplock, B. J., *Falmouth*	0	10	0
Diplock, Mrs., *do.*	0	10	0
Downing, Mrs. J. V., *do*	0	5	0
Downing, S. T. G., *Penzance*	0	10	0
Earle, F. H., *Falmouth*	0	10	0
Enys, F. G., *Enys*	2	2	0
*Falmouth, Right Hon. Viscount, *Tregothnan*	2	0	0
Field, T. W., *Marazion*	0	10	6
Fitz Gerald, Major-General C., *Falmouth*	0	5	0
Fitz Gerald, Mrs., *do.*	0	5	0
Fitz Gerald, J. C., *do.*	0	5	0
Fitz Gerald, C. M., *do.*	0	5	0
Foster, Richard, *Lanwithan*	0	10	0
*Fox, Miss, *Penjerrick, Falmouth*	1	0	0
Fox, Henry B., *Falmouth*	1	0	0
Fox, Mrs. Alfred, *do.*	0	10	6
*Fox, Alfred Lloyd, *Penmere, Falmouth*	1	1	0
Fox, Mrs. A. L., *do.*	0	10	6
*Fox, George H., *Falmouth*	0	10	0
Fox, Mrs. G. H., *Falmouth*	0	5	0
*Fox, Howard, *do.*	1	0	0
Fox, Mrs. H., *do.*	0	5	0
Fox, Olivia L., *do.*	0	5	0
Fox, H. Orme, *do.*	0	5	0
*Fox, Nathaniel, *do.*	0	10	0
*Fox, Robert, *do.*	1	0	0
*Fox, Mrs. R., *do.*	0	5	0
*Fox, Wilson L., F.R.Met.Soc., *do.*	0	10	0
Fox, Mrs. W. L., *do.*	0	5	0
*Fox, G. C., *do.*	0	5	0
*Fox, Mrs. G. C., *do.*	0	5	0
Fox, G. C., jun., *do.*	0	5	0
Francis, Miss, *do.*	0	5	0
*Francis, Miss A., *do.*	0	5	0
Freeman, Miss H. D., *do.*	0	5	0
Freeman, Miss A. J., *do.*	0	5	0
Freeman and Sons, Messrs. John, *Penryn*	2	2	0
*Gardner, Rev. C. R., *Falmouth*	0	10	0
Genn, W. J., *do.*	0	5	0

	£	s.	d.
*[illegible], Mrs., Falmouth	0	5	0
[illegible], Miss, do.	0	5	0
[illegible], Miss [illegible], do.	0	5	0
[illegible]	[illegible]	[illegible]	0
[illegible], do.	[illegible]	1	0
[illegible], Penryn	0	10	0
[illegible], Rev. J., [illegible]	0	10	0
[illegible], Robert, Falmouth	0	10	0
*[illegible], W. M., do.	0	[illegible]	0
[illegible], Mrs., do.	0	5	[illegible]
[illegible], Miss, do.	0	5	0
[illegible], M.D., do.	1	0	0
[illegible], A. B., M.D., do.	0	5	0
[illegible], Mrs., do.	0	5	0
[illegible], Miss, do.	0	5	0
[illegible], F. M., do.	0	10	0
*[illegible], Thomas, F.S.A., [illegible]	0	10	0
[illegible], Lieut. R.N., Falmouth	0	15	0
[illegible], Robert, [illegible]	0	10	0
[illegible], L., Falmouth	0	10	6
[illegible], Mrs., do.	0	10	6
Hare, Major John, [illegible]	0	10	6
Heard, E. G., *Truro*	0	10	0
Henderson, Capt. J., *do*	0	10	0

	£	s.	d.
Hill, F. V., *Helston*	0	10	0
Hockin, G. C., *Hayle*	1	0	0
*Hole, Rev. F. R., *Constantine*	0	10	0
*Hole, Mrs., *do.*	0	5	0
Holman, J., *Camborne*	0	10	0
Hooper, W., *Falmouth*	0	5	0
Hooper, Mrs., *do.*	0	5	0
Hooper, Miss, *do.*	0	5	0
Hosking, Capt. J., *Camborne*	0	10	0
*Husband, W., *Hayle*	1	0	0
Hugoe, Mrs., *Falmouth*	0	5	0
Hustler, Miss, *do.*	0	10	0
*Jago, J., M.D.Oxon., F.R.S., *Truro*	0	10	0
Jeffery, Miss, *Falmouth*	0	5	0
*Jeffery, Henry M., M.A., F.R.S., *do.*	0	10	0
Jose, John, *Mellingey*	0	10	0
*Kennerley, J. C., *St. Mawes*	1	1	0
Kinsman, J. K., *Antron, Mabe*	0	10	0
Lake, Mrs. J. H., *Falmouth*	0	5	0
Lake, Miss, *do.*	0	5	0
Lake, Miss Julia, *do.*	0	5	0
*Lanyon, G., *do.*	0	5	0
Lanyon, Mrs., *do.*	0	5	0
Lanyon, Miss, *do.*	0	5	0
Lavin, Michael, *Penryn*	0	10	0

	£	s.	d.
Lean, W. H., *Falmouth*	0	10	0
Liddell, J., R.N., *Bodmin*	0	10	0
Loam, Matthew, *Moditonham*	0	10	0
*Mackenzie, H. S., *Falmouth*	0	10	0
Mackenzie, Mrs., *do.*	0	5	0
Mackenzie, Miss, *do.*	0	5	0
Martyn, S. Symons, *Trenant, Sladesbridge*	0	10	0
Mayne, Rev. James, *Constantine*	0	10	0
Mayne, Mrs., *do.*	0	5	0
Mayne, Miss, *do.*	0	5	0
Michell, G. A., *Redruth*	0	10	0
Mitchell, J. H., *Falmouth*	0	5	0
Mitchell, Mrs., *do.*	0	5	0
Mitchell, Miss, *do.*	0	5	0
Mount Edgcumbe, Rt. Hon. Earl of, *Mount Edgcumbe*	2	2	0
Newman, F. W., *Falmouth*	0	10	0
Norway, Capt. N., R.N., *Flushing*	1	1	0
Oakshott, J., *Falmouth*	0	5	0
Oakshott, Mrs., *do.*	0	5	0
Oakshott, H. C., *Falmouth*	0	5	0
Oatey, Thos. Hy., *do.*	0	10	0
*Olver, W. S., *do.*	0	5	0
Olver, Mrs. W. S., *do.*	0	5	0
Olver, Miss, *do.*	0	5	0
Olver, T. R., *do.*	0	15	0
Olver, Mrs., *do.*	0	5	0
*Pendarves, W. Cole, *Pendarves*	1	1	0
Pender, Mrs. Geo., *Falmouth*	0	5	0
Pender, W. R. T., *do.*	0	10	0
Perry, J. S., *do.*	1	1	0
*Phillips, Charles, *do.*	0	10	0
Phillips, Mrs. C., *do.*	0	5	0
Phillpotts, Miss H. C., *St. Gluvias Vicarage, Penryn*	0	5	0
*Phillpotts, Rev. Canon, *Porthgwidden, Truro*	1	0	0
Philp, Mrs., *Falmouth*	0	5	0
Philp, Hastings, *do.*	0	5	0
*Pollard, Henry, *do.*	0	5	0
*Poole, J., *Hayle*	0	10	0
Pooley, R. Mason, M.D., *Falmouth*	1	1	0
Rashleigh, J., *Menabilly, Par*	1	1	0
Rashleigh, Evelyn W., *Kilmarth, Par Station*	0	10	0

	£	s.	d.
Read, J. B., *Penryn*	0	10	0
Read, Mrs., *do.*	0	5	0
Read, Thomas, *Falmouth*	0	5	0
Read, Miss, *do.*	0	5	0
Read, Miss J., *do.* ...	0	5	0
Reed, Com. G. H. B., *do.*	0	10	0
Rich, Capt. W., *Redruth*	0	10	0
*Robartes, Right Hon. Lord, *Lanhydrock*..............	1	1	0
*Rogers, Mrs. J. J., *Lamorva, Falmouth*	1	0	0
Rogers, Mrs. R., *Carwinion, Falmouth*	0	10	6
Rogers, R. N., *Falmouth*	0	10	0
Rogers, Mrs. R. N., *do.*	0	5	0
*Rogers, Rev. W., M.A., *Mawnan* ...	1	0	0
Rogers, Mrs. W., *do.*	0	5	0
*Rogers, Rev. Canon, M.A., *Gwennap* ...	0	10	0
Rogers, Miss Ellinor, *Penzance*	0	10	0
Rogers, Capt., R.A., *Penrose, Helston* ...	1	0	0
*Ross, C. C., *Penzance*	1	1	0
Sara, N., *Falmouth* ...	0	10	0
Sara and Burgess, *Penryn*	1	0	0
*Savary, Datzel T., *Falmouth*	0	10	0
*Sawle, Lady Graves, *Penrice, St. Austell*	0	10	0
*Scott, W. T., *Falmouth*	0	10	0
Scott, Mrs. W. T., *do.*	0	5	0
Sheriff, J. D., C.E., *Truro*	1	1	0
Shilson, Mrs., *Tremough*	0	10	0
Sisson, W., M.I.M.E., *Falmouth*	0	10	0
Sisson, Mrs., *do.*	0	5	0
Smith, Lady Protheroe, *Truro*	1	0	0
*Smith, George J., *Camborne*	0	10	0
Smith, W. Bickford, M.P., *Trevarno* ...	0	10	0
Smith, W. J. Boase, F.S.A., *Falmouth*...	0	10	0
*St. Aubyn, Sir John, Bart, M.P., *St. Michael's Mount* ...	2	2	0
*St. Aubyn, Lady Elizabeth, *do.* ...	1	0	0
St. Aubyn, Rev. St. Aubyn H. Molesworth, *Clowance* ...	1	0	0

	£	s.	d.
*St. Germans, Rt. Hon. Earl of, *Port Eliot, St. Germans*	1	1	0
Sterling, Miss, *The Crag, Falmouth*	1	1	0
Sterling, Miss H., *do.*	1	1	0
*Stephens, J., *Ashfield, Falmouth*	0	5	0
Stephens, Mrs. J., *do.*	0	5	0
Stephens, Miss, *do*	0	5	0
Stephens, J. G., *do*	0	5	0
Stephens, Miss Mary, *Falmouth*	0	5	0
Stevens, M., *do.*	0	10	0
Studden, J., *do.*	0	5	0
Studden, Mrs., *do.*	0	5	0
Studden, Miss, *do.*	0	5	0
Studden, Harry, *do.*	0	5	0
Tellam, R. V., *Bodmin*	0	10	0
*Tilly, H., *Boslowick, Falmouth*	0	10	0
Tonkin, Mrs., *Penzance*	0	5	0
Tregaskis, W., *Falmouth*	0	10	0
Tregelles, Miss M. E., *Falmouth*	0	5	0
*Tregelles, Miss A., *do.*	0	5	0
*Trelawny, Sir J. S., Bart., *Trelawne, Liskeard*	1	0	0
*Tremayne, Colonel, *Carclew*	2	2	0
*Tremayne, J., *Heligan, St. Austell*	2	2	0
*Tresidder, W. T., *St. Ives*	0	10	0
Trethowan, H. S., *Falmouth*	0	10	0
*Tweedy, R. M., *do.*	0	5	0
*Tweedy, Mrs., *do.*	0	5	0
Tweedy, Miss, *do.*	0	5	0
Tweedy, Arthur C., *do.*	0	5	0
Vyvyan, Rev. Sir Vyell, Bart., *Trelowarren, Helston*	1	0	0
*Vivian, A. P., *Bosahan*	2	2	0
Waters, Mrs., *Holyrood, Falmouth*	0	5	0
Watson, Mrs., *Falmouth*	0	5	0
*Webber, T., *do.*	0	10	0
Williams, J. C., *Caerhays Castle*	2	2	0
Williams, Michael Henry, *Pencalenick, Truro*	0	10	0
Williams, George, *Scorrier House*	1	0	0
*Willmore, A., *Falmouth*	0	10	0
Willmore, Mrs., *do.*	0	5	0

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Acland, Henry Dyke, *Stamford*	0	10	0
Barratt, Francis, B.A., LL.B., *London*	1	0	0
Bond, F. Walters, *do.*	0	10	0
Brett, R. B., *do.*	1	1	0
*Brooks, William, *Reigate*	0	10	0
Clinton, Rt. Hon. Lord, *Heanton Satchville, Devon*	1	0	0
Collins, J. H., F.G.S., *London*	0	10	0
Courtney, Leonard, M.P., *do*	1	0	0
Dymond, F. W., *Exeter*	0	10	0
Everard, Mrs., *Eton*	0	5	0
Faija, Henry, *London*	0	10	0
Ford, Mrs. J. F., *Bath*	1	1	0
*Fox, Francis E., B.A., F.R.G.S., *Tamerton*	0	5	0
Fox, Mrs. F. E., *do.*	0	5	0
Fox, F. W., *do.*	0	5	0
Fox, Joseph H., *Wellington*	1	1	0
Frecheville, R. J., F.G.S., *Plymouth*	0	10	0
Handcock, E., *Cardiff*	0	10	0
Hodgkin, Thomas, *Newcastle-on-Tyne*	1	0	0
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Northbrook, Right Hon. Earl, *London*	1	1	0
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Oxland, R., F.C.S., *Plymouth*	0	10	0
Pease, Sir J. W., Bart., M.P., *Hutton Hall, Guisbro'*	0	10	0
Pease, John William, *Newcastle-on-Tyne*	0	10	0
Pease, Mrs., *do.*	0	5	0
Pease, Miss S. H., *do.*	0	5	0
Prideaux, Charles *Plymouth*	0	10	0

	£	s.	d.
Smyth, W. W., M.A., F.R.S., *London*	1	0	0
St. Aubyn, Walter M., *do.*	1	1	0
Sturge, Robert F., *Clifton*	0	10	0
Tuckett, F. F., *Frenchay*, *Bristol*	1	0	0
Tuckett, P. D., *London*	0	10	0
Tuckett, Mrs. P. D., *do.*	0	10	0
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Williams, Michael, M.A., *Gnaton Hall*, *Yealmpton*, *S. Devon*	1	1	0

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TABLE OF SEA TEMPERATURE OFF FALMOUTH

for the year 1885, taken on board the S. S. "Briton," under the conditions explained in former years.

1885.	Number of Observations.	Means.	Absolute Maximum.	Absolute Minimum.	Monthly Mean Temperature 1872 to 1882.
		°	°	°	°
January	20	46·4	47·5	45·5	48·0
February	24	48·0	49·0	47·0	47·2
March	20	48·1	49·0	47·0	47·7
April	24	48·3	50·0	47·5	49·4
May............	26	50·4	51·0	50·0	52·2
June	23	55·8	58·0	54·0	55·2
July	26	56·1	61·0	56·0	58·2
August	27	60·7	62·0	58·0	59·7
September......	24	59·2	61·0	58·0	59·0
October	27	55·6	57·0	54·0	56·6
November......	25	52·5	54·0	51·0	52·9
December	26	50·0	53·0	49·0	49·5
Means..........	24	52·6	54·4	51·4	53·0

TABLE OF BRIGHT SUNSHINE AT FALMOUTH FOR THE YEAR 1885.

1885.	Number of hours of Bright Sunshine.	Greatest amount in one day.	Number of days on which Bright Sunshine occurred.
	o	o	
January	39·5	5·8	13
February	46·6	6·9	20
March..........	136·2	9·4	28
April	183·9	12·6	27
May............	187·1	12·3	30
June	204·9	13·8	21
July	219·3	13·3	30
August	234·9	12·9	30
September......	137·9	10·9	29
October	108·5	8·8	24
November	45·1	6·0	14
December	61·2	6·9	17
Sums	1605·1	119·6	283
Means..........	133·8	10·0	23·6

CLIMATOLOGICAL OBSERVATIONS

TAKEN AT CARMINO, FALMOUTH, FOR THE YEAR 1885.

Height above mean sea level 90 feet.

1885.	Means at 9 a.m.		TEMPERATURE.							Mean amount of cloud at 9 a.m.	RAIN.	
			MEANS.				EXTREMES.					
	Tem.	Rel. Hdy.	Min	Max.	Rnge.	Mns.	Min.	Max.	Rnge.		Amnt.	No. of days.
	°	%	°	°	°	°	°	°	°			
Jan. ..	42·8	87	39·4	46·6	7·2	43·0	30·8	53·1	22·3	7·9	3·95	21
Feb. ..	46·7	87	42·6	50·5	7·9	46·6	34·3	54·8	20·5	8·2	5·18	22
March.	44·3	79	39·6	48·8	9·2	44·2	33·3	54·3	21·0	6·9	1·69	14
April..	48·1	76	41·1	52·0	10·9	46·5	33·9	65·4	31·5	6·1	3·41	15
May ..	51·4	77	44·1	54·7	10·6	49·4	36·4	61·3	24·9	8·0	2·44	18
June ..	58·3	78	52·1	62·1	10·0	57·1	45·9	73·4	27·5	6·6	2·59	9
July ..	62·8	74	54·4	66·8	12·4	60·6	46·5	82·5	36·0	6·7	0·55	7
Aug. ..	61·7	73	53·1	65·3	12·2	59·2	47·3	73·4	26·1	5·6	2·49	11
Sept. ..	57·7	80	50·7	61·5	10·8	56·1	37·6	66·5	28·9	7·4	6·73	24
Oct. ..	50·5	81	45·2	54·4	9·2	49·9	40·3	58·8	18·5	7·6	8·88	27
Nov. ..	49·9	86	46·4	52·4	6·0	49·4	38·3	56·5	18·2	8·6	5·04	20
Dec. ..	43·6	83	40·3	47·8	7·5	44·0	29·1	54·2	25·1	7·3	2·72	14
Means.	51·5	80	45·7	55·2	9·5	50·5	37·8	62·8	25·0	7·2	45·67 3·80	202 17

N.B.—The Thermometers are placed in a Stevenson Screen at a height of 4 feet over grass, and are divided on the stem and verified. The rainfall is from the eight-inch copper rain gauge (belonging to the Meteorological Council) at Woodlane, and readings below ·01 inch have been rejected. The rain is measured at 10 a.m. and with the maximum temperature is entered to the previous day. On the 31st December the Stevenson Screen was removed with the Thermometers to the New Observatory.

TABLE OF BRIGHT SUNSHINE AT FALMOUTH FOR THE YEAR 1885.

1885.	Number of hours of Bright Sunshine.	Greatest amount in one day.	Number of days on which Bright Sunshine occurred.
	o	o	
January	39·5	5·8	13
February	46·6	6·9	20
March	136·2	9·4	28
April	183·9	12·6	27
May	187·1	12·3	30
June	204·9	13·8	21
July	219·3	13·3	30
August	234·9	12·9	30
September	137·9	10·9	29
October	108·5	8·8	24
November	45·1	6·0	14
December	61·2	6·9	17
Sums	1605·1	119·6	283
Means	133·8	10·0	23·6

CLIMATOLOGICAL OBSERVATIONS

TAKEN AT CARMINO, FALMOUTH, FOR THE YEAR 1885.

Height above mean sea level 90 feet.

1885.	Means at 9 a.m.		TEMPERATURE.							Mean amount of cloud at 9 a.m.	RAIN.	
			MEANS.				EXTREMES.					
	Tem.	Rel. Hdy.	Min	Max.	Rnge.	Mns.	Min.	Max.	Rnge.		Amnt.	No. of days.
	°	%	°	°	°	°	°	°	°			
Jan. ..	42·8	87	39·4	46·6	7·2	43·0	30·8	53·1	22·3	7·9	3·95	21
Feb. ..	46·7	87	42·6	50·5	7·9	46·6	34·3	54·8	20·5	8·2	5·18	22
March.	44·3	79	39·6	48·8	9·2	44·2	33·3	54·3	21·0	6·9	1·69	14
April..	48·1	76	41·1	52·0	10·9	46·5	33·9	65·4	31·5	6·1	3·41	15
May ..	51·4	77	44·1	54·7	10·6	49·4	36·4	61·3	24·9	8·0	2·44	18
June ..	58·3	78	52·1	62·1	10·0	57·1	45·9	73·4	27·5	6·6	2·59	9
July ..	62·8	74	54·4	66·8	12·4	60·6	46·5	82·5	36·0	6·7	0·55	7
Aug...	61·7	73	53·1	65·3	12·2	59·2	47·3	73·4	26·1	5·6	2·49	11
Sept...	57·7	80	50·7	61·5	10·8	56·1	37·6	66·5	28·9	7·4	6·73	24
Oct. ..	50·5	81	45·2	54·4	9·2	49·9	40·3	58·8	18·5	7·6	8·88	27
Nov...	49·9	86	46·4	52·4	6·0	49·4	38·3	56·5	18·2	8·6	5·04	20
Dec. ..	43·6	83	40·3	47·8	7·5	44·0	29·1	54·2	25·1	7·3	2·72	14
Means.	51·5	80	45·7	55·2	9·5	50·5	37·8	62·8	25·0	7·2	45·67 3·80	202 17

N.B.—The Thermometers are placed in a Stevenson Screen at a height of 4 feet over grass, and are divided on the stem and verified. The rainfall is from the eight-inch copper rain gauge (belonging to the Meteorological Council) at Woodlane, and readings below ·01 inch have been rejected. The rain is measured at 10 a.m. and with the maximum temperature is entered to the previous day. On the 31st December the Stevenson Screen was removed with the Thermometers to the New Observatory.

The Table which follows is an illustration of the mildness of the Climate of Falmouth as compared with other sea side places. The observations are extracted from those published by the Royal Meteorological Society, in the Meteorological Record, and refer to the temperature during January last at Falmouth, Ilfracombe, Torquay, and Guernsey.

STATION. 1885.	Means at 9 a.m.		TEMPERATURE.					Mean amount of Cloud at 9 a.m.
			MEANS.			EXTREMES.		
	Temperature.	Humidity.	Min.	Max.	Means.	Min.	Max.	
JANUARY.	°	c	°	°	°	°	°	0–10
Falmouth	42·3	87	39·4	46·6	43·0	30·8	53·1	7·9
Ilfracombe	42·5	83	39·3	46·3	42·8	31·5	54·4	8·0
Torquay	41·5	82	37·1	44·8	41·0	29·5	51·9	8·6
Guernsey	40·5	90	37·6	44·5	41·1	29·1	51·3	8·1
FEBRUARY.								
Falmouth	46·7	87	42·6	50·5	46·6	34·3	54·8	8·2
Ilfracombe	46·7	89	42·7	50·2	46·5	31·9	56·6	7·3
Torquay	46·1	86	41·7	49·9	45·8	29·8	54·7	8·3
Guernsey	45·7	93	42·8	49·5	46·1	36·5	55·1	7·4
MARCH.								
Falmouth	44·3	79	39·6	48·8	44·2	33·3	54·3	6·9
Ilfracombe	43·5	82	39·8	47·3	43·5	33·1	52·3	5·5
Torquay	42·7	77	38·0	47·3	42·6	31·3	55·7	7·0
Guernsey	43·5	81	40·4	48·4	44·4	34·1	55·7	6·3

MISCELLANEOUS. The burst of hot weather which occurred during the 19th, 20th, and 21st of April, is remarkable. The maximum temperature on those days was 65°·4, 62°·5, and 61°·4 respectively. The spring and summer were exceptionally dry, and may have been the cause of the flowering of an unusual number of the Phormium tenax (New Zealand Flax) in this neighbourhood. The Dracœnas and Euclalypti were also particularly beautiful in this respect.

The great heat which occurred on the 26th of July, when the very high temperature for this neighbourhood of 82°·5 was registered at Carmino, should not be passed over without notice. A County newspaper gave the shade temperature at Truro at 2.40 p.m. as 108°, and at 2.55 p.m. at 100°. These returns are clearly fallacious, and attention is called to them to demonstrate how useless observations are unless accurately read and made with first rate instruments, placed in suitable positions. The temperature recorded on the same day at the Royal Institution at Truro, was 89°·0, just 19° lower.

The rainfall in July was only half an inch; whilst in September and October it was much above the average for these months, viz:—6·73 and 8·88 inches respectively.

It seems to be becoming more and more the practice of certain individuals to prophesy as to future weather in a reckless guess-work manner, of which several instances have come under the writer's notice, and no doubt other glaring examples may readily be recalled by those who have studied the contributions to the public press on the subject.

In the interests of legitimate forecasting this disposition should be discouraged and discountenanced as much as possible. As these random shots are generally falsified, the public are apt to put all forecasts, more or less, in the same category, and the reputation of this branch of Meteorology suffers in consequence.

TABLE No. 1. WEST CORNWALL AND SCILLY ISLANDS, 1885.

DATE.	PRESSURE OF AIR.						TEMPERATURE OF AIR.										WIND.				HYGROMETRIC CONDITION.							RAIN.	
1885.	Mean pressure of the Atmosphere.	Maximum pressure observed.	Date of Maximum.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of Vapour.	Mean temperature of the Air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Mean monthly range.	Relative proportion of				Mean temperature of Evaporation.	Mean temperature of Dew point.	Mean difference between Dew point & air	Mean humidity—complete saturation=100	Mean weight of vapour in cubic ft. of air.	Mean additional weight of vapour required to saturate a cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	Number of rainy days.
																N	E	S	W									
	in.	in.		in.		in.	°	°	°	°	°		°		°					°	°	°		grs.	grs.	grs.		
Bodmin ..	29·930	30·570	12—23	28·800	1—31	·295	49·9				81·0	7—26	22·0	12—11	27·4	80	68	103	114	47·2	44·6	5·1	83	3·39	0·68	544·0	51·77	218
Truro	29·922	30·618	12—23	28·814	1—31	·300	50·2	57·7	43·4	14·3	89·0	7—26	20·0	12—11	34·7	81	69	98	117	47·4	44·5	5·7	81	3·40	0·82	543·3	44·59	197
Falmouth .	29·963	30·632	12—23	28·798	1—31	·301	49·8 •	54·5	45·8	8·7	79·8	7—26	28·1	12—9	23·3	77	64	103	121	47·3	44·6	5·1	83	3·40	0·74	544·5	47·05	208
Scilly	29·945	30·560	12—23	28·770	1—31	·328	51·7	54·7	47·4	7·3	74·0	7—27	32·0	12—9	19·3	96	73	93	103	49·4	46·9	4·8	84	3·67	0·71	541·9	32·12	221
	29·940	30·594		28·795		·306	50·4	55·6	45·5	10·1	80·9		25·5		26·2	84	68	99	114	47·8	45·1	5·2	83	3·46	0·74	543·4	43·88	211

• The mean temperature of the air at Falmouth is taken from the means of the daily readings at 8 a.m. and 8 p.m.

TABLE No. 2. FALMOUTH OBSERVATORY. Latitude 50° 9′ 24″ N.; Longitude 5° 3′ 30″ W.

Date.	Pressure of Air.										Temperature of Air.									Temperature of the Sea.
1885.	Mean pressure of the Atmosphere.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Maximum pressure recorded.	Date of Maximum.	Minimum pressure recorded.	Date of Minimum.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Absolute Maximum.	Absolute Minimum.	Date of Absolute Minimum.	Monthly range.	
	in.	in.	in.	in.	in.		in.		in.	in.	°	°	°	°	°	°	°	°	°	°
Jan....	29·860	29·968	29·760	·208	30·464	7	28·798	31	1·666	·237	42·6	45·7	39·8	5·9	52·5	29	31·9	19	20·6	46·3
Feb. ..	29·797	29·915	29·563	·352	30·186	12	29·053	16	1·133	·268	45·5	49·6	42·9	6·7	54·0	24—27	35·5	21	18·5	48·0
March.	30·096	30·207	29·975	·232	30·580	14	29·286	6	1·294	·220	42·9	47·7	39·7	8·0	53·4	3	33·8	10	19·6	48·1
April..	29·794	29·903	29·683	·220	30·348	19	29·029	24	1·319	·250	45·9	50·9	41·9	9·0	62·8	19	34·7	3	28·1	48·3
May ..	29·913	30·004	29·822	·182	30·236	11	29·170	22	1·066	·287	49·3	54·3	45·0	9·3	59·7	26	39·6	12—13	20·1	50·4
June..	30·068	30·127	29·984	·143	30·413	11	29·684	20	0·729	·381	56·5	61·4	51·1	10·3	71·0	14	46·4	22	24·6	55·8
July ..	30·209	30·252	30·162	·090	30·394	22	29·868	19	0·526	·409	60·1	65·8	53·9	11·9	79·8	26	48·1	1	31·7	56·1
Aug...	29·987	30·039	29·934	·105	30·337	14	29·603	9	0·734	·388	58·3	64·8	52·6	12·2	72·6	23	47·0	5	25·6	60·7
Sept...	29·923	30·011	29·822	·189	30·334	22	29·153	10	1·181	·373	55·2	60·9	50·7	10·2	66·1	5	36·8	27	29·3	59·2
Oct. ..	29·810	29·921	29·668	·253	30·171	17—18	29·096	9	1·075	·281	48·8	53·4	45·2	8·2	58·2	6	40·1	11	18·1	55·6
Nov. ..	29·869	29·954	29·772	·182	30·322	6—7	29·136	26	1·186	·294	48·8	51·9	46·4	5·5	56·1	29	38·3	15	17·8	52·5
Dec. ..	30·236	30·354	30·129	·225	30·632	23	29·086	5	1·546	·228	43·3	47·5	40·4	7·1	53·8	5	28·1	9	25·7	50·0
Means..	29·968	30·055	29·856	·199	30·368		29·247		1·121	·301	49·8	54·5	45·8	8·7	61·7		38·4		23·3	52·6

N.B.—The Instruments at Falmouth belong to the Meteorological Council, with whose permission the results are published.

TABLE No. 1. WEST CORNWALL AND SCILLY ISLANDS, 1885.

DATE.	PRESSURE OF AIR.						TEMPERATURE OF AIR.									WIND.				HYGROMETRIC CONDITION.							RAIN.	
1885.	Mean pressure of the Atmosphere.	Maximum pressure observed.	Date of Maximum.	Minimum pressure observed.	Date of Minimum.	Mean elastic force of Vapour.	Mean temperature of the Air.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Maximum.	Absolute Minimum.	Date of Minimum.	Mean monthly range.	Relative proportion of N	E	S	W	Mean temperature of Evaporation.	Mean temperature of Dew point.	Mean difference between Dew point & air	Mean humidity—complete saturation=100	Mean weight of vapour in cubic ft. of air.	Mean additional weight of vapour required to saturate a cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	Number of rainy days.
	in.	in.		in.		in.	°	°	°	°	°		°		°					°	°	°		grs.	grs.	grs.		
Bodmin ..	29·930	30·570	12—23	28·800	1—31	·295	49·9				81·0	7—26	22·0	12—11	27·4	80	68	103	114	47·2	44·6	5·1	83	3·39	0·68	544·0	51·77	218
Truro	29·922	30·613	12—23	28·814	1—31	·300	50·2	57·7	43·4	14·3	89·0	7—26	20·0	12—11	34·7	81	69	98	117	47·4	44·5	5·7	81	3·40	0·82	543·3	44·59	197
Falmouth .	29·963	30·632	12—23	28·798	1—31	·301	49·8[*]	54·5	45·8	8·7	79·8	7—26	28·1	12—9	23·3	77	64	103	121	47·3	44·6	5·1	83	3·40	0·74	544·5	47·05	208
Scilly	29·945	30·560	12—23	28·770	1—31	·328	51·7	54·7	47·4	7·3	74·0	7—27	32·0	12—9	19·3	96	73	93	103	49·4	46·9	4·8	84	3·67	0·71	541·9	32·12	221
	29·940	30·594		28·795		·306	50·4	55·6	45·5	10·1	80·9		25·5		26·2	84	68	99	114	47·8	45·1	5·2	83	3·46	0·74	543·4	43·88	211

[*] The mean temperature of the air at Falmouth is taken from the means of the daily readings at 8 a.m. and 8 p.m.

TABLE No. 2. FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 8′ 30″ W.

DATE.	PRESSURE OF AIR.										TEMPERATURE OF AIR.									Temperature of the Sea.
1885.	Mean pressure of the Atmosphere.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Maximum pressure recorded.	Date of Maximum.	Minimum pressure recorded.	Date of Minimum.	Monthly range.	Mean elastic force of Vapour.	Mean Temperature.	Mean of daily Maxima.	Mean of daily Minima.	Mean daily range.	Absolute Maximum.	Date of Absolute Maximum.	Absolute Minimum.	Date of Absolute Minimum.	Monthly range.	
	in.	in.	in.	in.	in.		in.		in.	in.	°	°	°	°	°	°	°	°	°	°
Jan....	29·860	29·968	29·760	·208	30·464	7	28·798	31	1·666	·237	42·6	45·7	39·8	5·9	52·5	29	31·9	19	20·6	46·3
Feb. ..	29·797	29·915	29·563	·352	30·186	12	29·053	16	1·133	·268	45·5	49·6	42·9	6·7	54·0	24—27	35·5	21	18·5	48·0
March.	30·096	30·207	29·975	·232	30·580	14	29·286	6	1·294	·220	42·9	47·7	39·7	8·0	53·4	3	33·8	10	19·6	48·1
April..	29·794	29·903	29·683	·220	30·348	19	29·029	24	1·319	·250	45·9	50·9	41·9	9·0	62·8	19	34·7	3	28·1	48·3
May ..	29·913	30·004	29·822	·182	30·236	11	29·170	22	1·066	·287	49·3	54·3	45·0	9·3	59·7	26	39·6	12—13	20·1	50·4
June ..	30·058	30·127	29·984	·143	30·413	11	29·684	20	0·729	·381	56·5	61·4	51·1	10·3	71·0	14	46·4	22	24·6	55·8
July ..	30·209	30·252	30·162	·090	30·394	22	29·868	19	0·526	·409	60·1	65·8	53·9	11·9	79·8	26	48·1	1	31·7	56·1
Aug. ..	29·987	30·039	29·934	·105	30·337	14	29·603	9	0·734	·388	58·3	64·8	52·6	12·2	72·6	23	47·0	5	25·6	60·7
Sept. ..	29·923	30·011	29·822	·189	30·334	22	29·153	10	1·181	·373	55·2	60·9	50·7	10·2	66·1	5	36·8	27	29·3	59·2
Oct. ..	29·810	29·921	29·668	·253	30·171	17—18	29·096	9	1·075	·281	48·8	53·4	45·2	8·2	58·2	6	40·1	11	18·1	55·6
Nov. ..	29·869	29·954	29·772	·182	30·322	6—7	29·136	26	1·186	·294	48·8	51·9	46·4	5·5	56·1	29	38·3	15	17·8	52·5
Dec. ..	30·236	30·354	30·129	·225	30·682	23	29·086	5	1·546	·228	43·3	47·5	40·4	7·1	53·8	5	28·1	9	25·7	50·0
Means..	29·963	30·055	29·856	·199	30·368		29·247		1·121	·301	49·8	54·5	45·8	8·7	61·7		38·4		23·3	52·6

N.B.—The Instruments at Falmouth belong to the Meteorological Council, with whose permission the results are published.

TABLE No. 3. FALMOUTH OBSERVATORY. LATITUDE 50° 9′ 24″ N.; LONGITUDE 5° 3′ 30″ W.

DATE.	WIND.										HYGROMETRIC CONDITION.							RAIN.	
1885.	Relative proportion of				Mean velocity in miles per hour.	Max. velocity during one hour.	Day and hour of Max. velocity.	Direction of Max. velocity.	Mean pressure in lbs. per sqr. foot.	Maximum pressure.	Mean temp. of evaporation.	Mean temp. of Dew Point.	Mean difference between dew point & air.	Mean Humidity complete saturation=100.	Mean weight of vapour in a cubic foot of air.	Mean weight of vapour required to saturate a cubic foot of air.	Mean weight of a cubic foot of air.	Rain in inches.	No. of rainy days.
	N	E	S	W															
					miles	miles			lbs.	lbs.	°	°	°		gr.	gr.	gr.	in.	
Jan. ..	5	9	10	7	*	*	*	*	*	*	40·9	38·9	3·7	87	2·72	0·44	550·7	4·035	21
Feb. ..	1	1	14	12	*	*	*	*	*	*	43·9	42·1	3·4	88	3·03	0·47	546·3	5·380	23
March.	10	8	7	6	*	*	*	*	*	*	40·2	37·0	5·9	80	2·54	0·64	554·9	1·640	14
April..	9	7	7	7	*	*	*	*	*	*	43·3	40·3	5·6	82	2·87	0·71	545·8	3·405	17
May ..	4	1	9	17	15·7	39	20th, 11 a.m.	W by S	1·2	7·60	46·7	43·9	5·4	82	3·28	0·75	544·1	3·020	19
June ..	7	7	8	8	12·4	40	20th, 4 p.m.	WNW	·77	8·00	53·9	51·5	5·0	83	4·27	0·83	538·6	2·820	13
July ..	4	7	9	11	11·4	*	*	*	·65	3·92	56·5	53·4	6·7	79	4·54	1·28	537·4	0·545	8
Aug. ..	7	8	8	8	12·1	41	12th, 11 a.m.	SW	·73	8·40	55·0	52·0	6·3	80	4·34	1·12	535·3	2·645	11
Sept. ..	6	0	10	14	15·7	52	10th, 11 p.m.	NNW	1·2	13·52	53·0	50·9	4·3	86	4·18	0·74	537·3	6·780	24
Oct. ..	11	3	3	14	18·7	45	9th, 7 a.m.	WNW	1·7	10·12	46·2	43·4	5·4	81	3·18	0·70	542·8	9·285	25
Nov. ..	3	8	10	9	17·3	50	28th, 6 a.m.	SSW	1·5	12·50	46·7	44·5	4·3	85	3·28	0·60	548·9	4·810	21
Dec. ..	10	5	8	8	14·2	44	28th, 3 p.m.	SSW	1·0	9·68	40·8	37·9	5·4	81	2·63	0·60	557·0	2·740	12
Means.	77	64	103	121	14·7	44·4			1·08	9·98	47·3	44·6	5·1	83	3·40	0·74	544·5	47·055	208

* No record from January to April, and from June 24th to July 16th, the Anemometer being under repair.

TABLE No. 4. BODMIN. LATITUDE 50° 28′ 30″ N.; LONGITUDE 4° 42′ 20″ W.

Meteorological Register kept by Commander J. LIDDELL, R.N.

DATE.	PRESSURE OF AIR.					TEMPERATURE OF AIR.											RAIN.						REMARKS.
1885.	Mean pressure.	Maximum pressure observed.	Date.	Minimum pressure observed.	Date.	Mean Temperature.	Absolute Maximum.	Date.	Absolute Minimum.	Date.	Minimum on grass.	Date.	Mean temperature of 36 years.	Max. diff. between wet & dry bulbs.	Date.	Mean differences of wet & dry bulbs.	Rain in inches.	Number of rainy days.	Greatest rainfall.	Date.	Mean rainfall of 36 years.	No. of rainy days in 36 years.	
	in.	in.		in.		°	°		°		°		°	°		°	in.		in.		in.		
Jan. ..	29·83	30·43	7	28·80	31	39·6	52	29	27	14	25	14	42·1	3	2	1·6	3·88	20	0·78	28	5·25	22·3	
Feb. ..	29·65	30·16	12	28·98	2	44·4	52	15	26	21	24	21	43·1	3	17	1·7	5·67	21	1·31	1	3·92	18·7	A mild month.
March.	30·06	30·52	14	29·36	3	41·4	52	3	30	17	24	17	44·2	4	7	2·5	2·61	14	0·56	2	3·34	18·6	
April..	29·76	30·30	19	29·12	25	47·3	65	20	31	4	24	4	50·5	5	3	2·9	6·00	16	1·10	24	3·02	14·7	Large rainfall. Very seasonable month
May ..	29·80	30·18	31	29·36	21	52·0	65	31	36	12	31	13	55·6	6	16	3·3	3·17	25	0·76	21	2·78	14·0	A large number of rainy days.
June ..	30·06	30·38	11	29·74	8	61·3	72	13	45	10	42	22	59·5	10	28	3·8	2·75	11	1·32	23	3·05	14·7	
July ..	30·21	30·40	22	29·90	19	60·2	81	26	43	14	40	10	62·5	5	4	3·3	0·84	11	0·30	7	3·19	16·7	A very dry month.
Aug. ..	29·96	30·30	14	29·72	28	59·8	74	19	45	15	43	15	62·2	7	16	3·0	2·76	12	0·74	6	3·69	16·8	A cold but fine month.
Sept. ..	29·89	30·30	22	29·41	10	56·5	65	16	36	27	27	27	59·0	5	2	2·0	9·02	23	3·13	10	4·25	17·2	Very cold and excessive rainfall.
Oct. ..	29·90	30·14	18	28·96	10	48·0	55	6	37	13	32	15	52·9	5	12	2·0	7·80	28	0·79	30	5·72	20·8	A large rainfall.
Nov. ..	29·84	30·28	7	29·21	26	46·9	57	29	34	16	29	15	46·0	3	20	1·7	4·71	21	1·04	25	5·32	20·7	Very mild month.
Dec. ..	30·21	30·57	23	29·44	6	39·4	51	17	22	11	20	11	42·7	4	4	1·8	2·56	16	1·25	5	5·28	20·0	Cold and small rainfall.
Means..	29·930	30·330		29·333		49·7	61·7		34·3				51·7			2·5	51·77	218			48·81	215·2	

REMARKS.—Height of RAIN GAUGE above the sea 315 feet, and above the ground one foot. Diameter of Gauge (Cassella's) five inches. Barometer reduced to sea-level and 32° of temperature. Thermometers are hung four and a half feet above the ground (sheltered), and facing North.

The means are those of 36 years. The greatest rainfall 71·93 inches in 1872; the least 33·15 inches in 1854. The greatest Barometric pressure 30·95 inches on the 18th January, 1882; the least, 28·06 on the 23rd of January, 1872, at 3 a.m.

WINDS	North......	25	East	39	N. East	25	S. East	44
	South......	53	West......	37	N. West......	76	S. West......	66

EXPLANATION OF DIAGRAM.

(On Opposite Page).

The curves shown in the accompanying Diagram are based on observations taken at the Meteorological Observatory at Falmouth, with instruments belonging to the Meteorological Council.

It will be observed that the Diagram is divided vertically into months, weeks and days; the months being separated by thick lines, the weeks by thinner lines, and the days by the finest lines. Opposite every Sunday the day of the month is inserted at the upper part of the Diagram. Thus the day of the month and the day of the week may be readily ascertained.

In the upper part of the Diagram the Velocity of the Wind is shown; the spaces between the finest horizontal lines representing two miles per hour. The velocity indicated by the curve is the average of the whole of the 24 hours from midnight to midnight; and this velocity is shown by the height of the curve midway between the fine lines dividing the days.

Below the curve of velocity the prevailing Direction of the Wind during the day from midnight to midnight is inserted.

In the lower part of the Diagram is a curve of Barometrical Pressure drawn on a natural scale, and representing the average height of the Barometer for the 24 hours composing every day; the height of the curve midway between the fine lines dividing the days indicating the average pressure. In all cases the Barometric Readings have been reduced to 32° at mean sea level.

Below this curve, the mean temperature of the day is given in degrees Fahrenheit.

D TEMPERATURE

JUNE	

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PRIZE LIST, 1886.

ROYAL CORNWALL
Polytechnic Society,

FOR THE ENCOURAGEMENT OF
Science and the Fine and Industrial Arts.

INSTITUTED 1833.

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ROYAL CORNWALL

POLYTECHNIC SOCIETY.

[illegible]

ANNUAL EXHIBITION

[illegible]

Polytechnic Hall, Falmouth,

[illegible] September [illegible], 18[illegible]

The ART UNION of CORNWALL

[illegible]

[illegible]

[illegible] will take place at the Polytechnic Hall during the Exhibition.

[illegible]

[illegible]

[illegible]

EDWARD KITTO, F.R.Met.Soc.,

Polytechnic Hall, Falmouth.

FIFTY-FOURTH

ANNUAL EXHIBITION.

REGULATIONS FOR COMPETITION.

1. Competitors are divided into two classes.

2. The FIRST CLASS consists of Members of the Society, and of any person paying three shillings to be allowed to compete for Medals and Prizes, who shall be entitled to a non-transferable ticket admitting once to the Exhibition.

3. The SECOND CLASS consists of persons of the working order and persons under sixteen years of age. Second Class competitors may compete for Medals and Prizes without any subscription, but are not entitled to free admission to the Exhibition.

4. No competitor shall be entitled to a medal or prize for any article which has appeared at a previous Exhibition of the Society, unless showing some improvement.

5. When medals are awarded, the converting them into money according to the following scale shall be at the discretion of the Committee, provided that the applicant already possesses a medal of similar value :—

First Silver Medal	£5	0	0
Second ditto	3	10	0
First Bronze Medal	2	0	0
Second ditto	1	5	0

6. Medals only (not convertible into money) can be awarded to patented or registered articles.

7. No holder of a medal or prize may receive an award of the same or a lower value for similar subjects in the same department at the next two subsequent Exhibitions; but the Committee are empowered to give certificates of merit to persons excluded by this rule.

8. The Committee are empowered to withold any medal, prize, or premium, at their discretion.

9. Every Exhibitor must sign the Entry Form, to be obtained of the Secretary, before his exhibit can be received by the Society.

10. All Articles intended for exhibition must be delivered at the Polytechnic Hall, Falmouth, not later than Tuesday, September 7th, or they will not be eligible for competition.

MEDALS AND PRIZES.

SPECIAL EXHIBITIONS OF LOCAL PRODUCTS & INDUSTRIES.

In order to extend information concerning the local products and industries of Cornwall and Devon, and to aid where possible in their development in a systematic manner, it has been decided to make certain departments of Western Produce and Manufacture special features at some of the Exhibitions of the Polytechnic Society.

It is thought that all which are of an inorganic nature may conveniently be treated in three groups, namely :—

1. *Rocks, metallic, and general earthy minerals.*
2. *Clays and fictile manufactures.*
3. *Chemical, textile, and general manufactures.*

The first of these groups will be dealt with at the forthcoming Exhibition, which will open on Tuesday, the 14th September next, at the Polytechnic Hall, Falmouth.

It is intended to divide this year's exhibits as follows :—

I.—ROCKS.—(1) Building materials; (2) Ornamental stones; (3) General purposes.

II.—MINERALS.—(1) Metallic; (2) Earthy, excluding clays.

Under each of these heads it is desired to obtain examples of all the native products of Cornwall and Devon, in the various stages of their preparation for the market from the raw material. The Committee of the Royal Cornwall Polytechnic Society earnestly hope to have general co-operation in the execution of this object, and a full representation in particular of any special features.

Medals and Premiums are offered by the Society under the following heads :—

1. A Silver Medal for the best collection of the local Building Stones used in ancient buildings in Cornwall and Devon, with notes of places where employed and dates.

2. A Silver Medal for the best collection of local Building Stones used in modern buildings.

3. A Silver Medal for the best collection of local Ornamental Stones undressed and polished—in general use.

4. A Silver Medal for the best collection of local Ornamental Stones, i in general use, but adapted for ornamental purposes—undressed and polish

5. A Bronze Medal for the best collection of local stones for Paving a nd Metalling.

6. A Silver Medal for the best collection of Local Metallic Minerals c mercial value in groups (if with associated rocks the better.)

7. A Silver Medal for the best collection of local Earthy Minerals of commercial value (excluding rocks and clays.)

8. A Bronze Medal for the best collection of local Cements.

9. A Bronze Medal for the best Collection of local Mineral Paints.

10. A Silver Medal for the best collection of Local Mineral Products, at present not commercially valuable, but which may be made so.

In all cases localities must be clearly given, and the descriptions must be full and accurate. The awards will depend upon the actual not relative value of the exhibits.

Entry forms and all information can be obtained of

R. N. WORTH, F.G.S., Chairman of Sub-Committee,
4, Seaton Avenue, PLYMOUTH, or
HOWARD FOX, Hon. Secretary, ditto, FALMOUTH.

MECHANICS.

Medals and Prizes in Books or Money are offered by the Society for useful Inventions or Improvements, which must be explained by models or drawings and full descriptions. The drawings to be sufficiently large to be distinctly seen. All descriptions and communications should be written on foolscap paper, on one side only, leaving one inch margin.

Sec. I.—Steam Engines & Boilers, and Machinery connected therewith, &c.

Medals are offered by the Society for :—

1. For the best method of constructing Skip Roads, or of strengthening and improving those at present in use, with a view to the adoption of safety catches, or other appliances for reducing the risk in transit in mine shafts.

2. For the best method of joining the ends of wire ropes together, or of joining wire ropes to the chain runner by shackles or otherwise, applicable to the uses of Cornish mines.

3. For the best method by which the strength of wire ropes in daily use can be tested.

4. For the best appliance by which water can be raised from the sumps of shafts, or from sump winzes other than by the use of bucket lifts, applicable to Cornish mines.

5. Improved Stamping Machinery.

6. For the best design (exemplified either in actual operation, or by model or drawings) of steam boiler or furnace, adapted to be economically fired with liquid or gaseous fuel; or of any new motor to be worked independently of boiler.

In addition to the Medals and Prizes offered by the Society, the following Premiums are open for Competition.

1. DRESSING ORES. A Premium by the Society for Improved Machines for, or modes of Dressing Ores.

2. COLLECTIONS OF ORES. A Premium is offered by the Society for Collections of Ore and Matrix in which the relations of one to the other are carefully marked.

3. CROSS SECTIONS. A Premium not exceeding £3, by the Society, for accurately-drawn cross sections of Cornish Mining districts.

Medals and Prizes in Books or Money are offered for Essays and Scientific Papers.

SPECIAL PREMIUMS.

1. DUES IN DEVON AND CORNWALL.—Three Premiums in Books by the Editor of the *Mining Journal*, value £3 3s., for the best, £2 2s., for the second-best, and £1 1s., for the third-best essays on "Dues in Cornwall and Devon as affecting Adventurer, Miner, and Owner." The books shall be chosen by the writer of the paper.

2. MINERAL VEINS.—A Premium of £2 by the Society, and £3 by Colonel Tremayne, for the most exact account of the phenomena of mineral veins in any mine or district; their dip, direction, variations in productiveness slides, heaves, &c.

3. DUTY OF CORNISH ENGINES.—A Premium is offered by the Society for the best Essay treating on the reasons for the diminished duty of Cornish Pumping Engines, and giving practical suggestions for its improvement.

4. WINDING MACHINERY.—A Premium is offered by the Society for the best essay on Winding Appliances for Cornish Mines, including different classes of engines; winding drums; construction of poppet heads; ropes; diameters of, and shape of grooves in, pulleys relatively to the ropes employed; also appliances to prevent overwinding, or to minimise injury resulting from it.

All papers in this section must be sent to the Secretary AT LEAST THREE WEEKS before the Exhibition commences.

Sec. II.—Sanitary and Domestic Inventions & Improvements.

1. A Premium is offered by the Society for improved Stoves for economising fuel.

2. A Premium is offered by the Society for an improved system of Ventilation of Dwellings and Public Buildings.

3. Premiums are offered by the Society for Sanitary and Domestic Inventions and Improvements.

Sec. III.—Other Branches of Mechanics.

The Society offers Medals and Prizes in Books or Money for :—

1. Useful Inventions and Improvements.
2. Models or drawings of Machines or Mechanical Appliances by workmen and apprentices.
3. Specimens of good Workmanship by Amateurs, Workmen, or Apprentices

PRIZES OFFERED TO APPRENTICES.

1.	Prize of	10s. 0d.	for the best specimen of Joinery, by boys under	17.
2.	,,	7s. 6d.	,, ,, ,, ,,	15.
3.	,,	10s. 0d.	for the best specimen of Wood Carving, by boys under	17.
4.	,,	7s. 6d.	,, ,, ,, ,,	15.
5.	,,	10s. 0d.	for the best specimen of Wood Turning, by boys under	17.
6.	,,	7s. 6d.	,, ,, ,, ,,	15.

The judging in all departments of the Exhibition (except Shorthand) will take place on Monday, September 13th.

NAVAL ARCHITECTURE.

Medals and Prizes, in Books or Money, are offered by the Society for meritorious productions in the various branches of Naval Architecture.

A Medal is offered by the Society for the best Model illustrating an improved method of lowering and disengaging boats from a ship's side with speed and safety.

STEAM FISHING VESSELS. A medal is offered by the Society for the best model illustrating the employment of Steam in Fishing Vessels, accompanied by drawings and description; the objects to be aimed at being the reduction of manual labour on board, freedom from injury to nets or lines, and means of bringing the produce quickly and economically to market.

A Premium is offered for the best means of preventing the influx of water into the boiler and engine-room compartments of steam vessels.

CHEMISTRY, ELECTRICITY, &c.

Medals and Prizes in Books or Money, are offered by the Society for improved applications of Chemical Science.

Prizes are offered to Students and Workmen for Analyses of Minerals.

Prizes are offered for Monographs on any groups or families of Salts, as the Phosphates, Arseniates, &c., whether occurring naturally or not.

Prizes are offered for Collections of Artificial Crystals.

A Premium is offered for any new and successful experiment in the application of the Electric Light for use in mines, or otherwise.

FINE ARTS.

Medals and Prizes are offered by the Society for meritorious productions in the following subjects:—

Sculpture and Modelling—Architecture—Art Metal Work—
Original Designs adapted for Manufactures in Serpentine,
Granite, Porphyry, Terra Cotta, &c.

PROFESSIONAL ARTISTS.

The Society invites Professional Artists to forward their works to the Exhibition. The ART UNION OF CORNWALL selects its Prizes from the pictures exhibited by Professional Artists.

AMATEURS.

Section I.—Oil Paintings and Water Colours.

1. **For the best original Figure Picture in Oil—a Silver Medal.**
2. **For the best original Figure Picture in Water Colour—a Silver Medal.**
3. **For the best original Landscape in Oil—a Silver Medal.**
4. **For the best original Landscape in Water Colour—a Silver Medal.**

5. For the best China Painting, original design—a Silver Medal.
6. For the best China Painting, design not original—a Bronze Medal.

NOTE. All Persons who have ever sold a Picture from an Exhibition shall be deemed *Professional*.

Prizes of 15s. and 7s. 6d. are offered for Water Colour Drawings by persons under 15 years of age. The age to be stated.

Section II. Pencil, Crayons—Engraving and Etching—Lithography, &c.

PREMIUMS.

£2 is offered by the Society for the best wall or other House decoration, including designs for Needlework.

£1 is offered by the Society, to persons under 20 years of age, in each of the following subjects:—

1. For the best filled Sketch-book, from Nature.
2. For the best series of Six Flowers, Leaves, or Animals, from Nature, in Chalk or Pencil.
3. For the best shaded Crayon Drawing of one of the busts in the Polytechnic Hall, full size; or the bust of any well-known character.
4. For the best Engraving on Wood.
5. For the best sketch of Marine Scenery.
6. For the best Studies of Boats, fishing luggers, trawlers, &c., in pencil, water colours, or oils.

Prizes of 10s. and 7s. 6d. are offered for Pencil and Crayon Drawings of flowers, from Nature, or of Natural Objects, by persons under 16 years of age. The age to be stated.

PHOTOGRAPHY.

In all cases state whether the work is Professional or Amateur, and name process of production.

All work sent for competition must have been executed within eighteen months of the date of this Exhibition.

Carte-de-visite Portraits are excluded from Exhibition, except when illustrating some special process or novelty.

PROFESSIONAL PHOTOGRAPHERS.

Medals are offered by the Society for meritorious productions in the following subjects:—

1. For Landscapes.
2. For Portraits.
3. For Composition Pictures.
4. For Instantaneous Pictures.
5. For Interiors.
6. For Transparencies for Lantern or Window Decoration.
7. For Pictures by improved processes.
8. For Enlargements.

All enlargements for competition must be the work of the Exhibitor.

AMATEURS

Medals are offered for meritorious productions in this department.

PHOTOGRAPHIC APPLIANCES.

Medals are offered for improved Apparatus and Appliances, including Magic Lantern Apparatus, &c.

All exhibits in this department must be accompanied by a written explanation of their specialities.

NOTE.—Regulation 7 does not apply to the Photographic Department for this year.

* See foot note page 2.

NATURAL HISTORY.

Essays, Local Observations, Collections of Specimens, particularly such as illustrate the Natural History of the County.

All papers in this Section must be sent to the Secretary at least three weeks before the Exhibition commences.

Specimens must be properly arranged and accurately named, and should be accompanied by a paper stating when and where they were found, &c., and when practicable by observations made by the Exhibitor.

Prizes will be especially given for Monographs of any particular family or large genus indigenous to the County, either in Botany or Zoology, such as the *Gramineæ* or *Hieraceæ*; the *Holothuridæ* or the *Medusæ*; the *Palmipedes*; the *Rodentia*; &c.

A Medal is offered by the Society for the best Incubator. Preference will be given to the Exhibit in which chickens are to be seen in the course of being hatched, and recently hatched.

Prizes are offered for the following objects:—

1. Aquaria.
2. Collections of Wild Plants—distinguishing between those which are poisonous and those which are not poisonous.
3. Insects (named and classified) which are noxious to vegetation.

SPECIAL PREMIUMS

1. A Premium of £2, or books to that value, at the discretion of the Judges, for the best Illustrated Journal of Natural History.
2. A Premium of £2 or books to that value, at the discretion of the Judges, for the best Calendar of Nature, presenting in a tabular form the comparative view of the dryness or moisture of different years; exhibiting also the advance of the season by the time at which various trees, plants, &c., burst into leaf or flower—taking of course, the same trees each year.
3. A Premium of £2 by the Society, for the best paper recording personal observations and experiments as to the movements of carnivorous plants.
4. A Premium of £1 by Mr. T. Webber, for Specimens of Amateur Bird-stuffing—for a case of not less than two birds—particular attention to be paid to natural size and position.
5. A Premium of £1 by the Society, for specimens of setting up of fish.
6. A Premium of £2 by Mr. George H. Fox, for the best Essay on the Migratory Birds of Cornwall.

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[illegible] of the [illegible]

[illegible]

[illegible] the country, [illegible] information [illegible] statistics of the [illegible] the country, [illegible] to be [illegible] but [illegible]

[illegible] with information [illegible] to guide the [illegible]

[illegible] to the Secretary [illegible]

[illegible]

[illegible] age is be stated.

[illegible] the use of Shorthand [illegible] The skill of the [illegible] in taking down [illegible] and afterwards [illegible] ordinary writing. First Prize, £3; [illegible]

[illegible] other [illegible] may be used, and arbitrary marks for [illegible] parts of the verb "to be" and [illegible]

[illegible] the Polytechnic Hall, Falmouth, [illegible] p.m.

ART NEEDLEWORK.

Medals and Prizes are offered by the Society in the following subjects :

1. Original Specimens of Art Needlework in South Kensington Embroidery.

2. Specimens of Art Needlework, not original.

BRITISH LACE.

Medals and Prizes are offered by the Society for Specimens of British Lace.

Note.—All work for Competition must be done by the Exhibitor.

THE JUDGING in all departments of the Exhibition (except shorthand) will take place on MONDAY, SEPTEMBER 13TH, 1886.

[illegible] POLYTECHNIC SOCIETY.

THE [illegible] ANNUAL EXHIBITION.

ADVERTISEMENTS are invited for insertion in the [illegible] of the forthcoming Exhibition, which opens at [illegible] [illegible] and continues [illegible] the [illegible].

[illegible] copies of the [illegible] the Nobility and Gentry of the [illegible] as well as the representatives of the Mining and other [illegible] of the West of England; and will be consulted [illegible] medium for Advertising purposes [illegible] and as its pages will be [illegible] advertisements, at a fair charge, there will be [illegible] will thereby be ensured [illegible].

TERMS FOR ADVERTISEMENTS.

Whole page [illegible] ... [illegible]
Half page ... [illegible]
Quarter page ... [illegible]
Cover—Inside page [illegible] ... [illegible]
Half do. do. ... [illegible]
Inside page ... [illegible]
[illegible] Blocks received for insertion.

All communications and copy for Advertisements to be sent, not later than September 7th, to the Society's authorised Agents for Advertisements, Messrs. [illegible] and Co., [illegible]

[illegible]

1885. 1885.

CATALOGUE

OF THE

FIFTY-THIRD ANNUAL

EXHIBITION

OF

The Royal Cornwall

POLYTECHNIC SOCIETY

AT THE

POLYTECHNIC HALL, FALMOUTH

FROM

September 22nd to September 26th.

FRED. B. EARLE, MACHINE PRINTER, QUAY, FALMOUTH.

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CATALOGUE.

Mechanics.

Sections I., II., III.

1 Model of Marine Expansion Engine ... ... J. Jobson
Second Bronze Medal
2 Model of Horizontal Reversing Engine ... W. Francis
Prize 10s.
3 One 2-inch Parabolic Engine Governor, with Stop and Balance Valves combined; also Speeder to alter while Engine is in motion ... ... J. Tangye
4 Case of Engineer's Hand Tools, of cast steel ... D. Low
Commended
5 Brown's patent Safety Catch for Wire or Wood Guide Rods W. & T. Brown
6 "Star" Microscope, with one eye-piece, R. & J. Beck 2 2 0
7 Ditto with two ditto ditto 4 4 0
First Bronze Medal
8 Model of patent steel Two-horse Whippletrees Davey, Sleep & Co.
9 Model of Three-horse Equalizing ditto ditto
First Bronze Medal
10 Model of patent Automatic Belt Fastener ditto
11 Patent Universal Joint ... ... W. G. Edmonds
12 Model showing Gears and Levers for giving the necessary pressure to Silage Stacks ... Amos & Hunt

13 Model of special Portable Gear and Lever for giving the necessary pressure in Silos, &c. ... Amos & Hunt
First Bronze Medal
14 Dressing Composition for Silage Stacks ... ditto
15 Self-filling Dip-Tip for short removals of rubbish, &c.
George Thomas
16 Patent Duplex Turbine Water Wheel, fitted with patent self-governing gear ... ... A. & H. Williams
17 Two-inch Hydraulic Ram, for raising water from low levels
ditto
18 Set of three Throw Pumps, with gun metal barrels, 3-inch bore, 9-inch stroke ... ... ditto
19 Samples of Brenton's patent Belt Fasteners, for cotton or leather ... ... W. Brenton
20 Patent Bolt Fasteners ... ... ditto
21 Patent Cam Bolt, with spring ... ... ditto
22 Patent "Preston" Whippletree ... ... ditto
Commended
23 Combined Machine for Washing, Cooling, and Salting Butter from the Churn ... ... F. & C. Hancock
Second Bronze Medal
24 Combined Bread-crumbling and Lump Sugar-grinding Mill
ditto
25 Machine for Washing and Peeling Potatoes at one operation
ditto
First Bronze Medal
26 Jordan's Photographic Sunshine Recorder ... J. B. Jordan
Second Silver Medal
27 Frame of specimen Sunshine Curves ... ditto
28 Aerated Flower Pots ... ... E. Hele Clark
Recommended for Trial
29 Set of patent Lawn Tennis Poles ... Wm. Brenton
30 Specimen of Amateur Workmanship ... C. A. Hosking
Prize 10s.
31 Model of Frictionless Safety Hoist ... S. G. Bennett
First Bronze Medal
32 Working Model of patent Vibrapult ... J. Q. Dunstan
Highly Commended for Ingenuity
33 Eight Pressure Gauges ... ... C. Lindley & Co.
34 Lubricator for Steam Pipe ... ... ditto
First Bronze Medal
35 Five Wheel Valves ... ... ditto
36 Five sets Water Guage Fittings ... ditto
37 Two Box Valves ... ... ditto
38 Six Plug Cocks ... ... ditto

39 Six Gland Cocks ... ... C. Lindley & Co.
40 Eight Needle Lubricators ... ... ditto
41 Set Metallic Packing ... ... ditto
42 Four Pipe Wrenches ... ... ditto
43 Brittain Spanner and Pipe Wrench ... ditto
44 Budding Spanner ... ... ditto
45 Three Oil Cans ... ... ditto
46 Sample Case of Packings ... ... ditto
The Whole Series Commended
47 Six Bauer's patent Spanners, 24in. to 5in., James Gibbs & Co.
Commended
48 Two Bauer's Pipe Vices ... ... ditto
Second Bronze Medal
49 Four Wirth's patent Tube Scrapers ... ditto
50 Three improved Tube Expanders ... ditto
51 Patent 3-inch Tube Beader ... ... ditto
First Bronze Medal
52 Samples of Perrott's Belt Fasteners ... ditto
53 Sample Joint of ditto ... ... ditto
54 Reducing Socket for Gas or Engine Work ditto
55 Model Line of Rails and Railway Waggons, showing Automatic Railway Couplings ... T. A. Brockelbank
Second Silver Medal
56 Kinnear's Self-lighting Gas Burner and Tap with Governor
John E. Downing
Second Bronze Medal
57 " Eureka " Gas Cooking Stoves, in enamelled iron, and fitted with latest improvements ... John Wright & Co.
58 Newest designs in Heating and Warming Stoves ... ... ditto
59 Teague's Reversible Ventilating Fan, Tuckingmill Foundry Co.
60 Working Model of patent Road-sweeping Machine, applicable also to cleaning Lawns and Parks of Leaves, &c.
R. W. Tayler
Second Bronze Medal
61 Specimen of a Cask Stave fitted with patent Eyelet Bung Bushes, and tools for operating the same ditto
62 The improved " Climax " patent Rock Drills
R. Stephens & Son
63 Model of Railway Break of Guage ... Samuel R. Hawke
64 Injector and Feed Pump, Auxiliary ditto ditto
Second Silver Medal
65 Working Model of Automatic Discharging and Righting Skip and Waggon ... Kitto, Paul, and Nancarrow
First Bronze Medal

66 "Cerus" patent Traps ... ... Stephen A. Phillips
First Bronze Medal
67 Sewer Disconnections ... ... ditto
68 Barstow's patent Combination Water Filters, W. L. Barstow
First Bronze Medal
69 Putney's patent "Pavodilos" solid wood Flooring, Floor Boards, Panel Dado, and V-jointed Boards
Olver & Sons, Green Bank, Falmouth
70 Zimdar's patent Pneumatic Bells and Appliances ditto
71 Norton's patent Check Door Spring ... ditto
72 The Basset Rock Drill ... ... F. Bartle & Co.
73 The Barrow Rock Drill ... Barrow Rock Drill Co.
74 Improved Mounting Bar for ditto ditto
75 King's Magnetic Ore Separator ... Frederick J. King
First Silver Medal
76 Patent Wire Flooring for drying purposes, Lewis Olrick & Co.
First Bronze Medal
77 Patent Shaft Coupling and Adjustable Hangers ditto
78 Four Perambulators ... ... John Johnson
79 Goat Carriages .. .. ditto
80 Child's Folding Chair ... ... ditto
Highly Commended
81 The "Simpless" Flower Pot Cleaner ... Walter E. Bennett
82 Patent Unique Folding Boxes, Thomas B. Bethell, *Commended*
83 Cement-testing Machine (Spoor's patent), John Lamb Spoor
Second Silver Medal
84 Designs for Church, &c. ... ... W. E. Hill
85 Board—imitation Lime Stone and Black Marbles, W. Courtis
86 Ditto ditto Sienna and Limestone ditto
87 Ditto ditto Mahogany and Maple Woods ditto
88 Ditto ditto Walnut and Satin ditto ditto
10s. for Series
89 Working Patterns of Stephens and Rodda's patent Pulveriser ... ... John Toy
90 Model of Machine for taking up the dollars at Gunwalloe, ditto
91 Model of a Cottage Roof ... .. Benjamin King
92 Set of Plans for Cottage Residence, designed and drawn by ditto
93 Set of Plans for a Gothic Cottage ... ditto
94 Model of a pair of Oscillating Marine Engines, as made for the Holyhead Mail Boats ... James Watt & Co.
First Bronze Medal
95 Series of Drawings of Cornish Mine Engines and other Machinery, dating from 1777, by James Watt
—lent by James Watt & Co.

96 Photos of general arrangement of Compound Marine Engines manufactured by Cox & Co,

97 The Labbez Telemeter, for measuring distances without calculation .. .. James H. Steward

98 Combined Reflecting Level and Prismatic Compass, for getting vertical and horizontal angles ... ... ditto

99 Mining Compass and Clinometer, for measuring slopes, verticals and horizontals ... ... ditto

First Bronze Medal

100 Drawings of Magnetic Separator ... Ernest Scott & Co.

102 Model of Improved Pulverizer ... Henry Broad

Prize 20s.

103 ditto ... Askham Brothers & Wilson

For Trial

104 Patent Window Frame ... ... W. B. Carne

First Bronze Medal

105 Elevation of a Double Blowing Engine (enlarged) Augustus W. Wakeham

106 Model of Baxter's patent Knapping-motion Stone Breaker W. H. Baxter & Co.

107 Original Design for a Drinking Fountain, scale, ¾ in. to a foot ... ... J. Harris

108 Plans for Fisherman's Cottage ... H. Maddern, jun.

109 Plans for Gamekeeper's do. ... ... ditto

Prize 10s.

110 Design for Cottage Residence ... Benjamin King

111 Plan of Gothic Cottage ... ... ditto

112 Ashton's New Steam-power Meter and Indicator Ernest Scott & Co.

First Silver Medal

113 Catapult, converted so as to take an aim T. A. Mannell (age 14)

Prize 5s.

114 Tricycle .. .. James Cooke (price £18)

115 Full-size Pulveriser, at work at Cox's Foundry Askham Brothers & Wilson

First Silver Medal

Essays.

161 Researches in Agricultural Chemistry,
Dr. A. B. Griffiths, F.R.S.Ed., F.C.S.
162 On the Physiology of the Invertebrata ditto
163 On the Storage and Transmission of Tidal Energy,
James Q. Dunstan
First Bronze Medal
164 Some Facts in the Life History of the Pollock,
as seen off the Coast of Cornwall ... Matthias Dunn
Second Silver Medal
165 Natural History Notes on the Perranwharf Valley, T. J. Porter
Prize 10s.
166 Historical Essay on Architecture ... Benjamin King
Prize 20s.
167 On the Garden Botany of Cornwall William Roberts
Prize 7s. 6d.

Naval Architecture.

170 Complete Model of H.M. Yacht Victoria and Albert
made to Scale from the published lines, Thomas H. Ivey
Prize 20s.
171 Model of Liardet's Patent Lowering and Detaching
Apparatus for Ships' Boats Ernest Scott and Co.
Second Silver Medal
172 Cruising Canoe with Centre Board, Self-reefing
Sails, Circular Rudder Yoke, Adjustable
Backboard and Stretchers Richard John Turk
(with 174) *Second Silver Medal*
173 Radix Patent Folding Centre Board ditto
First Bronze Medal
174 Newly Invented Rudder with Centre Board ditto
Commended
175 Model of Viking Ship found in Landefjant,
Norway ... ... Henry Jepsen
176 A Patent Seam for the Decks and Cabin Tops of
Yachts, also for the Seams between the planking of Yachts ... ... T. G. Tagg & Son
First Bronze Medal

177	Patent Improvement in the hanging of rudder for small boats	T. G. Tagg & Son
178	Patent Swivel Rowlock for Boats ...	ditto
179	Patent Swivels and Outriggers for Boats	ditto
180	Patent Improved Line Throwing Apparatus	Copeland and Lacey *Second Silver Medal*
181	Model of ditto	ditto
182	Lengthening of "Shadow," Model	Betts and Williams *Commended*
183	Model of Patent Seat Raft	A. H. Williams *First Bronze Medal*

Fine Arts.

Section 1a.—Contributed and Professional Artists' Oil Paintings.

211	Geraniums	H. L. Haslope	4	4	0
212	Autumn Leaves	ditto	3	3	0
213	Portrait	J. B. Maguire			
214	Twilight	Julie Frigout	5	10	0
215	Evening, North Wales ...	ditto	7	10	0
216	Study of Fruit	Margaret Wales	10	0	0
217	Curfew-time	C. E. Corke	15	15	0
218	The Garden Gate of the Manor	ditto	4	4	0
219	On the Teign, Devon	F. Foot	6	6	0
220	Freshening Breezes ...	Gustave de Breanski	15	15	0
221	A Summer Sea, Beer ...	ditto	26	15	0
222	The Way down to the Beach, Whitsand Bay,	Walter D. Finch	3	3	0
223	Honeysuckle	H. T. Grylls	4	4	0
224	Geraniums	ditto	3	0	0
225	Carn Brea Castle ...	Stephen Michell	20	0	0
226	On the Teign	W. Williams	5	0	0
227	ditto	ditto	5	0	0

228	A Summer Day on the Banks of the Teign, Chagford ...	W. Williams	25	0	0
229	Child from life ...	Isabella Bannister	4	4	0
230	A Good Story	Alfred Banner	3	3	0
231	A Half-Holiday	ditto	4	0	0
232	Two of the Tennis Party ...	ditto	5	0	0
233	A Welsh Cottage ..	Westwood Lewis	2	2	0
234	A December Morning ...	Newton Herbert	3	10	0
235	After Service	ditto	1	5	0
236	Harford Bridge, Devon ...	George Shaw	5	5	0
237	Study of Flowers ...	E. Boaden	1	1	0
238	At Perranporth	G. Ficklin	12	12	0
239	A Summer Morning, Cadgwith	ditto	12	12	0
240	A Scene near Shaugh Bridge, Dartmoor	Thomas Dingle, jun.	4	0	0
241	A Scene on the Lyd, ditto	ditto	4	0	0
242	Old Mother Hubbard	E. Opie	35	0	0
243	Content	ditto	12	12	0
244	Mrs. Harvey's blue Skye Terrier, "Jockey"	G. Ficklin			
245	Shaugh Bridge (on porcelain)	Cathering S. Willis	0	12	6
246	Cottage ditto	ditto	0	12	6
247	Portrait—Colonel Walter Raleigh Gilbert, C.B., commanding Duke of Cornwall Artillery Volunteers	Sydney Hodges			
248	Lion Rock, Kynance ...	Maggie A. Carter	1	10	0
249	Poppies	Laurence Scott	4	4	0
250	Auriculas	ditto	2	2	0
251	All in a Garden Fair	ditto	3	3	0
252	Geese	ditto	1	0	0

Section 2b.—Contributed and Professional Artists' Water Colour Drawings.

331	Porthgwarra Cove, Land's End ...	J. C. Uren	5	5	0
332	A Quiet Morning, Mount's Bay	ditto	3	3	0
333	Beaches, Rewle Park, Kent ...	C. E. Corke	8	8	0

334	The Lake of Bienne	Jane Gibbons	6	6	0
335	Maenporth	C. N. Phillpotts	1	0	0
336	Kynance Cove	ditto	3	3	0
337	Staddon	Frank Browning	5	5	0
339	Setters	C. E. Brittan	7	7	0
340	Mill Boy Cove, Land's End	H. Preston	5	0	0
341	On the Tamar	ditto	2	15	0
342	Mont Orgueil Castle, Jersey	ditto	8	8	0
343	Newton and Noss	Frank Browning	10	10	0
344	Sequers Bridge	ditto	5	5	0
345	The Lock, Chertsey	Wm. Darton	4	0	0
346	Summer Sunshine	ditto	3	0	0
347	Wreck of the "John Keer," Mount's Bay,	J. O. Nash	10	10	0
348	Evening after the Storm	ditto	4	4	0
349	Ear Rocks, Mullion	ditto	3	3	0
350	"Queen of the Bay," Penzance Harbour	ditto	2	2	0
351	Hinch Cliff Road, Mullion	ditto			
352	The Pool, Sutton Harbour, Plymouth	Harry Murch	2	2	0
353	Macartney Rose	Nora Taylor	3	3	0
354	Solanum Jasminoides	ditto	3	3	0
355	Marigolds	Florence Taylor	1	10	0
356	Salpiglossis	ditto	2	2	0
357	Arundel Castle, from the Mill Stream	S. G. W. Roscoe	15	15	0
358	Penrose and the Loe	Jane Williams	1	0	0
359	The Bar Sand and Halzafron Cliffs	ditto	1	0	0
360	Mullion Cove	ditto	1	7	0
361	Old Factory, Ludlow	ditto	3	3	0
362	A Welsh Streamlet	Westwood Lewis	1	1	0
363	Hay Making	Mary Isabella Grant	8	8	0
364	Nice, Evening	ditto	5	5	0
365	A Devonshire Hay Rick	ditto			
366	Doe Tor, Dartmoor	Susan Selley	3	3	0
367	Near the Old Mill, Lydford	ditto	3	3	0
368	View at Shaldon	Thomas B. Worth	5	5	0
369	ditto	ditto	5	5	0
370	Roses	Ellen Genn	2	2	0
371	Sweet Peas	ditto	3	3	0
372	Roses	ditto			
373	Lion Rock, Kynance	G. H. Taylor	8	8	0
374	Church Rock, Bosiggran Head	ditto	8	8	0
375	Opposite Tregothnan Quay, on the Fal	ditto	14	14	0
376	Near Mullion	G. Ficklin	6	6	0

[illegible]	[illegible]	G. Ficklin	6	6	0
378	The Harvest Field ...	Thomas Dingle, jun.	5	0	0
379	A Scene near Mothecombe, South Devon	ditto	5	0	0
380	[illegible] Cove	J. O. Nash	5	5	0
381	Rose	Ellen Genn	1	1	0
382	Wild Flowers	ditto	3	3	0
383	Pansies	ditto			
384	[illegible] Valley	Maggie A. Carter	1	10	0
385	[illegible] Cove ..	ditto	1	10	0
386	[illegible] Rocks, Mullion ...	G. Ficklin	5	0	0
387	Autumn, near Padstow ...	W. Boase Smith	8	8	0
388	A Fresh Breeze	ditto	8	8	0
389	[illegible]	ditto	3	3	0
390	Sailing	H. S. Tuke	7	7	0
391	Coming Home	ditto	10	10	0
392	Across the [illegible]	S. M. Fox	5	5	0
393	Evening on the Thames ...	ditto	5	5	0
394	In the Campagna	ditto	5	5	0

The Philp "In Memoriam" Collection.

401	Falmouth Garrison ...	Contributed by	Mr. F. Benjamin
402	Falmouth Harbour ...	ditto	ditto
403	Falmouth from Flushing	ditto	ditto
404	Truro River ...	ditto	Mrs. Blight
405	Longships, Enys Dodman	ditto	Mr. J. Barclay
406	Mullion, Gull Rock ...	ditto	ditto
407	Falmouth Harbour ...	ditto	Mr. F. Benjamin
408	Trefusis	ditto	Mrs. Blight
409	Pendennis Castle from St. Mawes	ditto	Mr. E. D. Anderton
410	Falmouth	ditto	Mr. F. Benjamin
411	Bumble Rock ...	ditto	Mr. S. Tresidder
412	Arched Rock, Gyllyngvase	ditto	Mr. J. Barclay
413	Falmouth	ditto	Mr. F. Benjamin
414	Blockhouse	ditto	Mr. E. T. Turner
415	Pendennis from Boyer's Cellars	ditto	ditto

416	Lion Rock	Contributed by	Mr. T. R. Olver
417	Pendennis Castle	ditto	Mrs. Philp
418	Dinner in Harvest Field	ditto	ditto
419	Gull Rock	ditto	Mr. E. D. Anderton
420	Polperro	ditto	Mrs. Genn
421	Fisherman's Home, N. Devon	ditto	Mr. J. H. Mitchell
422	Minehead	ditto	Mrs. Philp
423	Going Afloat	ditto	ditto
424	Golden Horn	ditto	ditto
425	Near Bournemouth	ditto	ditto
426	Dartmoor	ditto	ditto
427	Haunt of the Sea Fowl	ditto	ditto
428	Garrison	ditto	ditto
430	Gower Cliffs	ditto	ditto
431	Miner's Bridge	ditto	ditto
432	After Collision	ditto	ditto
433	Morning on Coast	ditto	ditto
434	Petit Tor Beach	ditto	ditto
435	Caerphilly Castle	ditto	ditto
436	Summer Sunshine, Falmouth Bay	ditto	ditto
437	Fisherman's Stock-in-trade	ditto	ditto
438	Carting Sea Weed	ditto	ditto
439	Whitesand Bay	ditto	Mr. J. H. Mitchell
440	Derwentwater	ditto	Mrs. Philp
441	Trefusis	ditto	ditto
442	King Arthur's Castle	ditto	Mr. J. Barclay
443	Polruan Beach	ditto	Mrs. Philp
444	Laver Gatherers	ditto	ditto
445	Irish Lady	ditto	Mr. T. Webber
446	The Lizard	ditto	Mr. H. Fox
447	Base of Tol Pedn	ditto	Mr. T. R. Olver
448	Bright Day, N. Coast of Cornwall	ditto	Mr. H. Fox
449	Study	ditto	Mr. W. H. Dunstan
450	Pianosa	ditto	Mrs. Philp
451	Steeple Rock	ditto	ditto
452	Wreck	ditto	Mr. W. S. Olver
453	St. Michael's Mount	ditto	Mr. E. T. Turner
454	Pendennis Castle	ditto	ditto
455	Tempest Tossed	ditto	Mrs. Philp
456	Near Land's End	ditto	Mr. E. T. Turner
457	Among the Welsh Mountains	ditto	Mr. H. Fox
458	Black Rock, Falmouth Harbour	ditto	ditto
459	Evening	ditto	Mrs. Philp
460	Landing Fish	ditto	Mr. E. Kitto
461	Gyllyngvase	ditto	Mr. R. H. Carter

[illegible] Mr. W. H. Oliver
[illegible] Mrs. Philp
[illegible] Mr. [illegible]
[illegible] Mr. W. [illegible]
[illegible] Mrs. Philp
[illegible] Mrs. Knight
[illegible] ditto
[illegible] Mr. W. H. Oliver
[illegible] Mr. [illegible] Turner
[illegible] Mr. [illegible]
[illegible] Mr. [illegible] Oliver
[illegible] Mr. H. Fox
[illegible] Mr. [illegible]
[illegible] Mrs. [illegible]
[illegible] Mr. [illegible] Turner
[illegible] Mr. H. Fox
[illegible] Mrs. [illegible]
[illegible] Mrs. Knight

[illegible]

[illegible]
[illegible]
[illegible] Sanders
[illegible]
[illegible]
[illegible]
[illegible]
[illegible] Ellen Phillips
[illegible] ditto
[illegible] Courtney
[illegible] John Walters
[illegible]
[illegible] ditto
[illegible] ditto
[illegible] ditto
[illegible] ditto
[illegible] ditto

496	On the Banks of the Lee (copy)	Alice M. Tucker
497	Landscape „	ditto
498	Sea Piece „	M. Mazet
499	Trevose Head, Padstow	Wm. Oke
500	Watergate Bay	ditto
501	Mussel Rock, Watergate Bay	ditto
502	Mullet Rocks, Trevone, near Padstow	ditto
503	Cornish Children	Constance Hill
504	Gobo Bay, Guernsey (original)	R. R. Hall
505	Quietude „	ditto *First Silver Medal*
506	Entrance to Dartmouth Harbour (original)	ditto
507	A Stagnant Pool „	ditto
508	Child with an Apple (copy)	Mary C. Paul
509	Landscape after Birkett Foster,	Isabel F. M. Woolcombe
510	Plymouth Sound from Jennycliff Bay	Chas. Ripper
511	Clovelly Bay, Cattewater (original)	Jno. Walters
512	Off Plymouth Barbican „	ditto
513	Mount Batten, Plymouth „	ditto
514	On Hooe Lake „ „	ditto
515	Coal Hulks „ „	ditto
516	Portrait, Study from Life „	John Henwood Blamey *Second Silver Medal*

Section 2 b.—Water Colour Drawings by Amateurs.

501	Rough Weather, Newlyn Slip	Charles A. Eva
503	Book of Original Sketches	ditto
504	Near Waters Meet, East Lyn	Samuel Kerswell
505	North Hill, Clovelly	ditto
506	Gathering Olives, Mentone	ditto
507	Old Castle, South Wales	Minnie Piper, aged 13
508	Cottage and Well, Rowbotham	ditto
509	Cottage, Bromley, Kent	ditto
510	Spaniel and Dead Game	Eddy Brittan *Prize 15s.*
511	Cottages near Plymouth	James L. Nash

512	At Cattedown, near Plymouth	George Cooke
513	The last of an Old Sea Dog, Deadman's Bay, Plymouth	ditto
514	Goosewell Farm	ditto
515	At Anchor in Cattewater	ditto
516	Poppies (original)	Louisa Fortescue Croker
517	Cup of Maiden Hair	ditto
518	Scotch Scene	Minnie Piper
519	ditto	ditto
520	A Rustic Scene (original)	J. Chas. Richards
521	A Quiet Evening	ditto
522	Viaduct, near St. Blazey, Cornwall	Marie Maubant
		Second Silver Medal
523	Snow Flakes	ditto
524	Clovelly from the Quay	Theresa Hoblyn
525	Beach House, Clovelly	ditto
526	Welsh Cottage	ditto
527	Lane at Trefusis	ditto
		First Silver Medal
528	Old Cottage at Beer	A. W. Perry
529	On the Coly, Colyford	ditto
530	Trout Hole, near Colyton	ditto
531	Beer	ditto
532	White Cliffs, Beer	ditto
533	Frame of 6-Views, from Photos	W. Johns
534	Study of a Donkey	C. Westmacott
		First Bronze Medal
535	Four Original Studies from Nature	Ellen E. Stephens (age 14). *Prize 15s.*
537	Oyster Dredging on the Fal (original)	Alfred Thomas
537	Fisherfolk, Slapton Sands, Devon	ditto
538	Carn Brea Castle (original)	Chas. A. Hosking
539	Lilies (original	Marie Maubant
540	On the Dee	Minnie Piper
541	Newport Beach, near Falmouth (original)	J. P. Blamey
542	Falmouth Harbour, "Early Morning"	ditto
543	Chrysanthemums (original)	Rachel J. Fox
544	Portrait of Miss Lea (original)	Louisa J. Harris
545	Magnolias (original)	Rachel J. Fox

Section 3a.—Pen and Ink, Crayons, &c.

600	Two Studies from Life	Elizabeth G. Vawdrey
601	ditto	ditto
602	The Garden's Enemy	ditto

Amateur.—Pen and Ink, Crayons.

605	The Grotto of the Nativity	C. H. Small
606	The Baggage Waggon	ditto
607	The Weekly Register	ditto
608	A Garden Party	ditto
609	The Little Ones, enlarged from Photo	C. H. Palmer *First Bronze Medal*
610	Fishing Luggers coming home (original)	ditto
611	Crayon Drawing	E. Tangye
612	Ditto	ditto

Section 4.—Sculpture, Architecture and Ornamental Art.

622	Carved Panel, enlarged from Metal Miniature	F. J. Fox
623	Brass Repousse Music Stand	Laura Brown *First Bronze Medal*

[illegible] 12 6

[illegible] 6

[illegible] 0

each

[illegible] 0 0

[illegible]

[illegible] 0 0

[illegible] 15 0

[illegible] 10 0

[illegible] 12 6

[illegible] 15 0

[illegible] 15 0

[illegible] 7 6

[illegible] 7 6

[illegible]

[illegible] 6 0

[illegible] 10 0

[illegible] 0 4 0

[illegible] 1 15 0

[illegible] 11 11 0

[illegible] First Bronze Medal

[illegible] First Silver Medal

663	Frame of Photographs of Works executed by Harry Hems	.. Harry Hems			
664	Ditto	ditto			
665	Ditto	ditto			
666	Ditto	ditto			
667	Ditto	ditto			
668	Ditto	ditto			
669	Ditto	ditto			
670	Ditto	ditto			
671	Ditto	ditto			
672	Ditto	ditto			
673	Ditto	ditto			
674	Ditto	ditto			
675	Ditto	ditto			
676	Ditto	ditto			
677	Painted Terra Cotta Vase ...	Emma Bowden	0	5	0
678	Ditto	ditto	0	5	0
679	Folding Screen (original design)	Mary C. Coode			
		First Bronze Medal			
680	Folding Screen, painted from Nature	Ida C. Wickett	5	0	0
681	Various Examples of Painted China (original)	Suter Thomas			
		Second Silver Medal			
682	ditto	Evelyn Leggo			
		Second Silver Medal			
683	A Collection of Royal Barum Ware,	C. H. Brannam			
		First Silver Medal			
684	Original Canvas Painting for Back and Seat of Luton Chair,	George H. Ford			
685	Antimacassar Lustra Painting ...	Agnes Coates			
686	Lace for Wall Bracket ditto	ditto			
687	Screen Poppies (original design) ...	Lucy Genn	2	10	0
688	Examples of Painted China ...	C. S. Willis			
690	Breakfast Stand, Carved Walnut,	Rev. Alex. R. Eagar	3	3	0
691	Three Bread Trenchers, Carved Sycamore	do.	0 0 0	13 10 10	6 6 6
692	Panel for Screen, Poppies ...	Mary G. Borlase			
693	ditto Foxgloves	ditto			
694	ditto Japanese Anemones	ditto			
		Second Bronze Medal			
695	Panel for Lincrusta for Screen,	Emily Borlase	0	15	0
696	Fancy Chairs, &c.	F. Paarmann			

Professional Photography.

			£	s.	d.
[illegible]	[illegible]	[illegible]	4	4	0
		First Silver Medal			
[illegible]	[illegible]	[illegible]	1	1	0
[illegible]	[illegible]	[illegible]	1	1	0
[illegible]	[illegible]	[illegible]	1	1	0
[illegible]	[illegible]	[illegible]	1	1	0
[illegible]	[illegible]	[illegible]	0	15	0
[illegible]	[illegible]	Wm. [illegible]			
[illegible]	[illegible]	[illegible]			
		First Bronze Medal			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
		First Silver Medal			
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	1	11	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]	0	12	6
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]			

793	Five Niggers	Thos. P. Whaite			
794	Frame of Studies (4) ...	ditto			
795	Six Views	ditto			
796	View from Hampstead Heath—Nook in the Brent ..	John Austin	1	1	0
797	Hanwell Church—View, High Street, Acton	ditto			
798	Carbon Enlargement—Nook on the Brent ...	ditto	1	5	0
799	Studies of Owls	W. J. W. Stocks	0	5	0
800	Woodland, Scene in Wardsey Dell	ditto	0	6	6
801	A Perspective Class in the Old Schoolroom ...	ditto	0	6	6
802	Portrait Group of Uppingham School	ditto	0	6	0
803	An Old Blade	G. Renwick			
804	Preparing for a Rainy Day ...	ditto			
		Very Highly Commended			
805	Instantaneous Studies of Breaking Waves	W. P. Marsh	3	10	0
806	Enlarged Portrait of Child—Argentic Gelatine Bromide Paper	E. T. Shelton			
807	Enlarged Portrait of Lady—Argentic Gelatine Bromide Paper	ditto			
808	Frame of Transparencies of Cornish Views... ...	P. H. Fincham	3	3	0
809	St. Mary's Church, Banbury ..	G. Mold			
810	Northern Star Express, passing Banbury at 62 miles per hour	ditto	0	10	6
811	Northern Star Express, passing Banbury at 70 miles per hour	ditto	0	10	6
812	Children Feeding Swans—enlargement	W. G. Honey			
813	The Old Oak Tree	J. M. Brown	0	12	6
814	Summer Evening	ditto	0	12	6
815	Sandown Bay	ditto	0	12	6
816	A Breaker	ditto	0	12	6
817	A Roller	ditto	0	12	6
818	Shorwell Lane, Isle of Wight	ditto	0	12	6
819	Interior of Tower Cottage, Shanklin Chine	ditto	0	9	0
820	Interior of Homestead, Shanklin	ditto	0	9	0

[illegible]	[illegible] Shields	J. M. Brown	0	9	0
[illegible]	[illegible]	ditto	0	6	6
[illegible]	[illegible] and [illegible]	ditto	0	6	6
[illegible]	[illegible] Water and think of the [illegible]	J. Terras	0	12	6
[illegible]	[illegible]	ditto	0	12	6
[illegible]	[illegible]	ditto	0	10	6
[illegible]	[illegible]	ditto	0	7	6
[illegible]	[illegible] the News	ditto	1	1	0
[illegible]	[illegible] Balcarres House, Fife	ditto	0	5	0
[illegible]	[illegible] House, Fife	ditto	0	5	0
[illegible]	Enlargement from Large Negatives [illegible]	Morgan & Kidd			
[illegible]	The [illegible]	Alexander [illegible]	0	10	6
[illegible]	[illegible]	Harry Hughes	2	2	0
[illegible]	[illegible] a milking Sir she said	ditto	1	1	0
[illegible]	[illegible]	ditto	1	1	0
[illegible]	The [illegible]	[illegible] Brothers	0	15	0
[illegible]	[illegible]	ditto	1	0	0
[illegible]	[illegible]	ditto	1	0	0
[illegible]	[illegible]	ditto			
[illegible]	Frame of Instantaneous Views	E. Milner (Frith and Co.) *First Bronze Medal*			
[illegible]	Enlargement from [illegible] Negatives on [illegible] Paper	Morgan & Kidd *First Bronze Medal*			
[illegible]	Portrait [illegible] on Chloride of Silver Paper developed with [illegible]	ditto			
[illegible]	Portrait [illegible] on Chloride of Silver Paper developed with [illegible]	ditto			
[illegible]	[illegible] at [illegible]	J. P. Gibson *First Bronze Medal*	0	10	6
[illegible]	The [illegible] Dene	ditto	0	10	6
[illegible]	[illegible] North Tyne	ditto	0	10	6
[illegible]	A [illegible] on the North Tyne	ditto	0	10	6
[illegible]	On the North Tyne at [illegible]	ditto	0	10	6
[illegible]	[illegible] on the Green	ditto	0	10	6
[illegible]	[illegible]	ditto	0	10	6
[illegible]	[illegible] Dene	ditto	0	10	6
[illegible]	The [illegible] and her Victims	F. Whaley	1	1	0
[illegible]	[illegible] my Eyes	ditto	1	1	0
[illegible]	[illegible]	ditto	1	1	0

855	Interior	F. Whaley	1	1	0
856	ditto	ditto	1	1	0
857	ditto	ditto	1	1	0
858	Frame of Five Small Studies	ditto	1	1	0
859	The Mayor of Truro	Frederick Argall			
860	The Lord Bishop of Truro	ditto	1	1	0
861	It's so nice	ditto	1	5	0
862	Paper, Sir	ditto	1	10	0
863	Rebecca at the Well	ditto	2	0	0
864	Study, Head of Girl	ditto	1	10	0
865	Photo Transparency—Queen's Private Sitting Room	H. N. King			
866	Photo Transparency — Prince Consort's Music Room	ditto			
867	Photo Transparency — Prince Consort's Writing Room	ditto			
868	Photo Transparency — Royal Closet	ditto			
869	Photo Transparency — The Yellow Drawing Room	ditto			
870	Photo Transparency—Marble Hall	ditto			
871	Yacht Racing in the Solent	G. West & Son	3	3	0
		First Silver Medal			
872	Frame of Portraits	J. H. Coath			
873	Frame of Imperial Portraits	ditto			
874	Frame of Groups of Children	ditto			
875	Frame of Transparencies	G. Smith			
		Second Bronze Medal			
876	Small Studies	George Hadley	1	5	0
877	Instantaneous Studies	ditto	1	5	0
878	Baiting	ditto	0	15	0
879	See-Saw	ditto	0	12	6
880	The Milkman	ditto	0	15	0
880*a*	Can't Come, the Boat's Locked	ditto	0	15	0

Amateur Photography.

881	Frame of three Landscapes	George Bankart
882	ditto	ditto

[illegible]	George Beakart
	Second Bronze Medal
[illegible]	ditto
[illegible]	H. B. Hare
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	E. Brightman
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
	First Bronze Medal
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	C. Preston
[illegible]	[illegible] Emerson, B.A., M.B.
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	Dr. Puddicombe
[illegible]	A. G. Tagliaferro
[illegible]	A. Pringle
	Second Silver Medal
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	J. G. Gibson
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto
[illegible]	ditto

925	Instantaneous Views of Tynemouth, &c.	J. G. Gibson
926	"Give us this Day"	ditto
927	Work on Gray's Ferrotype Dry Plates	ditto
928	One dozen Lantern Transparencies	ditto
929	Lynmouth Village	E. Brightman
930	Glen Lyn	ditto
931	West Front of Bristol Cathedral	ditto

Photographic Appliances.

940	Sciopticon Lantern with Improved Focussing Arrangement	George Smith	4	10	0
941	Mechanical Lantern Slide Changer (Edward's patent)	ditto	3	3	0
942	Improved Blow-through Lime Jet	ditto	1	10	0
942*a*	Ditto Mixed Gas Jet	ditto	1	15	0
943	Portable Camera for ¼ Plates	ditto	3	15	0
		Highly Commended			
944	Set of Lenses for ditto	ditto	5	5	0
945	"Manx" Tripod Stand	ditto	0	15	6
946	"Brattice" ditto	ditto	0	12	6
947	Woodbury Photometer	ditto	0	5	0
948	Instantaneous Shutter	J. H. Steward			
949	Graduating Photographic Diaphragm	ditto			
950	Mechanical Lantern Slide Changer (Rudge)	ditto			
951	Model of Photo Camera, with Improved Slide Arrangement for Exposing	Joseph Smith			
952	Biophantascope	J. A. Rudge			
953	Dissolving Carrier for One Lantern	ditto			
954	Improved Photographic Camera	George Hare			
		Very Highly Commended			
955	Improved Patent Camera	Sands & Hunter			
956	Exhibition Camera	ditto			
957	Ditto with Reversing Frame	ditto			
958	Instantaneous Shutter	ditto			
959	Improved Folding Tripod	ditto			
960	Three Books for Sensitized plates	ditto			

[illegible] [illegible]

[illegible] for Excellence of Workmanship

[illegible]

[illegible] The [illegible] Company

First Silver Medal

[illegible] History.

[illegible]

[illegible] Howard Fox

[illegible] ... ditto

[illegible] Specimens [illegible] and Fossils from [illegible] ditto

[illegible] — — ditto

[illegible]

[illegible] ditto

[illegible]

[illegible] ... ... ditto

[illegible] — — Frederick W. Smith

[illegible] — — ditto

[illegible] ... ditto

[illegible] ... ditto

Second Silver Medal for Series

[illegible] Collection of Bee Furniture and Appliances Abbott Brothers

First Bronze Medal

[illegible] ditto ditto C. & J. Harris

First Bronze Medal

[illegible] ditto Bee Hives ... ... ditto

[illegible] Case of British Butterflies and Moths, Collected in Neighbourhood of Falmouth Ambrose Mayne

Prize 7/6

[illegible] Collection of British Plants ... ... Katherine Coode

Prize 10/-

[illegible] Case of [illegible] — ... Philip Chapman 5 0 0

[illegible] Case of [illegible] ... ... John Snell

[illegible] „ [illegible] ... ... ditto

[illegible] „ [illegible] ... ... ditto

[illegible] „ Echinodermata ... . ditto

990 Case of Crustacea ... ... John Snell
991 ,, ditto ... ... ditto
992 ,, ditto ... ... ditto
993 ,, Annulosa ... ... ditto
994 ,, Mollusca ... ... ditto

986 to 994 Illustrate the Marine Invertebrata of Falmouth and Adjacent Coast.

First Bronze Medal

995 British Butterflies and a few Moths, collected by L. T. Harris
996 The Butterflies of the Malay Peninsula (seven parts), exhibited by George Turner and presented by him to the Society
997 Botanical Specimens, collected during a fortnight's holiday in North Wales ... ... J. G. Wells

Prize 10s.

998 Book of Sketches of Sun Spots exhibited by Rev. W. Rogers
999 Samples of Raw Wools, Woollen Yarns, &c., illustrating various stages of manufacture ... R. Clarke & Co.

Shorthand.

H. Williams, Truro	PRIZE	£1	0	0
W. J. C. Gummow, Falmouth	,,	0	15	0
John Eustice, Camborne	,,	0	10	0
S. J. Hooper, St. Agnes	,,	0	10	0
J. Mullins, Mithian	,,	0	5	0
Mary Uren Francis, Pool	,,	0	5	0
W. H. Harris, Illogan		0	2	6

[illegible]

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[illegible]

[illegible]

[illegible]

15	Art Needlework, "Lilies" ...	Laura Dawe				
16	Four designs for Cosies ...	ditto				
17	Sofa Pillow, in Art Embroidery ...	Ellen M. Olver				
18	Specimens of Art Embroidery ...	Maggie Day				*Highly Commended*
19	Day Quilt, from an old Irish Pattern,	Julia Genn				*Second Prize 10s.*
20	Curtain, from an old design in Hampton Court Palace, 9th century ...	Mrs. A. Freeman				*First Prize 20s.*
21	Bolster Pillow	Mrs. G. C Fox	0	12	6	
22	Red Table Cloth	ditto	0	18	6	
23	Green Blotting Book ...	ditto	0	15	0	
24	Blue Satin Pincushion ...	ditto	0	10	6	*Highly Commended*
25	For Centre of Dinner Table...	ditto	1	7	0	*Highly Commended*
26	Original design for back of Luton Chair	G. H. Ford				
27	Original design for seat of ditto	ditto				
28	Mounted Poppy Screen	Lucy Genn				*Prize 10s.*

Lace.

30	Specimens of Honiton Lace	M. Downton	
31	Small Table Border, Macrame Lace ...	C. Gundry	*Prize 5s.*
32	Macrame Lace Border	R. L. Kinsman	*Prize 2s.*

[illegible] the [illegible] of the Board of Trade.

THE

Art Union of Cornwall.

[illegible] E. [illegible]

[illegible] W. [illegible] SHARPE.

[illegible] E. [illegible]

[illegible] E. [illegible]

[illegible] of the principal [illegible] and the chief [illegible] of their pictures; [illegible] mainly established and [illegible] the purchases are [illegible]

[illegible] the prizes will depend on [illegible] be selected by the [illegible] of the [illegible] or [illegible] or Photographs. [illegible] of the Exhibition.

[illegible] and Prize-holders [illegible] after the Drawing, which [illegible] Hall on Friday, September [illegible]

[illegible] each and any number [illegible]

[illegible] SHARPE, Hon. Sec.

BU [illegible]